THINGS

NOT GENERALLY KNOWN:

A

POPULAR HAND-BOOK

OF

FACTS NOT READILY ACCESSIBLE

IN

LITERATURE, HISTORY, AND SCIENCE.

EDITED BY
Ames
DAVID A. WELLS,
AUTHOR OF
"KNOWLEDGE IS POWER," "FAMILIAR SCIENCE," ETC.

Based on a work by John Timbs.

NEW YORK:
D. APPLETON AND COMPANY,
346 & 348 BROADWAY.
M.DCCC.LVII.

PREFACE.

The present volume is based upon a work bearing the same general title, published in London during the past year by Mr. John Timbs, the well-known author and compiler of several popular works. The rapid sale of more than twelve thousand copies of that book is sufficient evidence at once of its value and its popularity. The examination, however, of Mr. Timbs' book, preparatory to its republication here, showed that the original plan, though well executed, was susceptible of much improvement, not only by the correction of some errors and the omission of many articles of little value or of mere local interest, but also by the introduction of much additional information. A revision of the whole was therefore undertaken, during the intervals of leisure obtained from engrossing business pursuits, and the result has been the production of an essentially new book. At least half of the articles in the original work have been entirely omitted or altered by abridgment and addition, while so much new matter has been added as to render the present volume much larger than the English one. Some of these additions have been derived from "Popular Errors," an older book by Mr. Timbs, and from "Curiosities of History," a similar work very recently issued by the same industrious compiler. But a far larger number are the products of a somewhat extended and varied course of reading.

The general idea of the work will be readily gathered from its title and from a glance at its contents. It contains many little items of information, gathered from the broad fields of literature, history, and science, which are not contained in encyclopedias and ordinary hand-books, and which are not readily found when sought. In the departments of the Physical and Natural Sciences, moreover, are contained many interesting results of modern research, of too recent date to have found a place in ordinary scientific treatises. In a word, while this volume has little or no claim to a strictly scientific character, it is believed that it will be found at once useful, interesting, and familiarly instructive.

New York, March, 1857.

CONTENTS.

LANGUAGE, LITERATURE, AND BOOKS.

ORIGIN OF THE ENGLISH LANGUAGE.

SUPPOSE the English language to be divided into a hundred parts; of these, to make a rough distribution, sixty would be Saxon, thirty would be Latin (including of course the Latin which has come to us through the French), five would be Greek; we should thus have assigned ninety-five parts, leaving the other five, perhaps too large a residue, to be divided among all the other languages from which we have adopted isolated words. The Lord's Prayer consists of exactly sixty words. You will find that only the following six claim the rights of Latin citizenship—'trespasses,' 'trespass,' 'temptation,' 'deliver,' 'power,' 'glory.' Nor would it be very difficult to substitute for any one of these a Saxon word. This is but a small percentage, six words in sixty; and we often light upon a still smaller proportion. Thus take the three first verses of the 23d Psalm. Here are forty-five words, and only three of these are Latin,—'pasture,' 'comfort,' and 'convert,' and for every one of these, too, it would be easy to substitute a word of Saxon origin; little more, that is, than the proportion of seven in the hundred; while still stronger than this, in five verses out of Genesis containing one hundred and thirty words, there are only five not Saxon, less, that is, than four per cent. Still we must not conclude that the Anglo-Saxon words by any means outnumber the Latin in the degree which the analysis of these passages would seem to imply. It is not that there are so many more Anglo-Saxon words, but that the words which there are, being words of more pri-

mary necessity, are so many more times used, so much more frequently recur. The proportions which the dictionary, that is the language *at rest*, would furnish, are very different from those which the analysis of sentences or of the language *in motion* gives. This shows us that while the English language is thus compact in the main of these two elements, the Saxon and the Latin, we must not for all this regard these two as making, one and the other, exactly the same *kind* of contributions to it. On the contrary, their contributions are of very different character. The Anglo-Saxon is not so much one element of the English language, as the foundation of it, the basis. All its joints, its whole *articulation*, its sinews and its ligaments, the great body of articles, pronouns, conjunctions, prepositions, numerals, auxiliary verbs, all smaller verbs which serve to knit together and bind the larger into sentences, these, not to speak of the grammatical structure of the language, are exclusively Saxon. * * * Try to compose a sentence of ten words and no more on any subject you please, employing therein only words which are of a Latin derivation. You will find it impossible, or next to impossible, to do it. And while it is thus with the Latin, whole pages might be written, I do not say in philosophy or theology, or upon any abstruser subject, but on familiar matters of common every-day life, in which every word should be of Saxon derivation, and this too without giving to the sentences the least appearance of awkwardness or stiffness. Still it must not be concluded that the Latin portion of our language is of little value, or that we could draw from the resources of our Teutonic tongue efficient substitutes for all the words which it has contributed to our glossary. It will, however, *cæteris paribus*, in general be advisable, when a Latin and Saxon word offer themselves to our choice, to use the Saxon rather than the other. * * * Pathos in situations which are homely, or at all connected with domestic affections, naturally moves by Saxon words; lyrical emotion of every kind, which (to merit the name of *lyrical*) must be in the state of flux and reflux, or, generally, of agitation, also requires the Saxon element of our language, because the Saxon is the aboriginal element, the basis and not the superstructure; consequently it comprehends all the ideas which are natural to the heart of man, and to the elementary situations of life.—TRENCH, *on English Past and Present.*

ANALYSIS OF THE ENGLISH LANGUAGE.

The English language consists of about 38,000 words. This includes, of course, not only radical words, but all derivatives except

the preterites and participles of verbs; to which must be added some few terms, which, though set down in the dictionaries, are either obsolete, or have never ceased to be considered foreign. Of these, about 23,000, or nearly five-eighths, are of Anglo-Saxon origin. The majority of the rest, in what proportions we cannot say, are Latin and Greek: Latin, however, has the larger share.

It will thus be seen that the Anglo-Saxon, even if we look at the mere number of words, has contributed our principal source of strength. Sharon Turner, from our most popular writers, adduces a much greater preponderance of the Anglo-Saxon element; but he has not set down in figures the numbers of the two classes of words contained in any of these passages. Sir James Mackintosh analyzed three or four of them. We now give an analysis of the whole. The passages in question are from the Bible, Shakspeare, Milton, Cowley, Thomson, Addison, Spenser, Locke, Pope, Young, Swift, Robertson, Hume, Gibbon, and Johnson. In five verses out of Genesis, containing 130 words, there are only 5 not Saxon. In as many verses out of the Gospel of St. John, containing 74 words, there are only 2 not Saxon. Of the remaining passages, that from

		Not Saxon.
Shakspeare	81	13
Milton	90	16
Cowley	76	10
Thomson	78	14
Addison	79	15
Spenser	72	14
Locke	94	20
Pope	84	28
Young	96	21
Swift	87	9
Robertson	114	34
Hume	101	38
Gibbon	80	31
Johnson	87	21

In none of these passages is the number of foreign words greater than one-third; in many of them less than one-tenth. In all there are 1,492 words, of which only 296 are not Saxon. Taking this as a criterion, the Saxon would constitute about four-fifths of the language, instead of five-eighths, or about thirty-two fortieths, instead of twenty-five fortieths.—*Edinburgh Review*, *No.* 141.

1*

THE RELATIVE PROPORTION AND IMPORTANCE OF THE NORMAN AND SAXON ELEMENTS IN OUR LANGUAGE.

We should confidently conclude that the Norman was the ruling race, from the noticeable fact that all the words of dignity, state, honor and pre-eminence, with one remarkable exception (to be adduced presently), descend to us from them—sovereign, sceptre, throne, realm, royalty, homage, prince, duke, count ('earl' indeed is Scandinavian, though he must borrow his 'countess' from the Norman), chancellor, treasurer, palace, castle, hall, dome, and a multitude more. At the same time the one remarkable exception of 'king' would make us, even did we know nothing of the actual facts, suspect that the chieftain of this ruling race came in not upon a new title, not as overthrowing a former dynasty, but claiming to be in the rightful line of its succession.

And yet while the statelier superstructure of the language, almost all articles of luxury, all that has to do with the chase, with chivalry, with personal adornment, is Norman throughout; with the broad basis of the language, and therefore of the life, it is otherwise. The great features of nature, sun, moon and stars, earth, water and fire, all the prime social relations, father, mother, husband, wife, son, daughter, these are Saxon. The palace and the castle may have come to us from the Norman, but to the Saxon we owe far dearer names, the house, the roof, the home, the hearth. The instruments used in cultivating the earth, the flail, the plough, the sickle, the spade, are expressed in his language: so to the main products of the earth, as wheat, rye, oats, bere, i. e. barley, and no less the names of domestic animals. Concerning these last it is not a little characteristic to observe that the names of almost all animals, so long as they are alive, are thus Saxon, but when dressed and prepared for food become Norman,—a fact indeed which we might have expected beforehand; for the Saxon hind had the charge and labor of tending and feeding them, but only that they might appear on the table of his Norman lord. Thus ox, steer, cow, are Saxon, but beef, Norman; calf is Saxon, but veal Norman; sheep is Saxon, but mutton Norman; so it is severally with swine and pork, deer and venison, fowl and pullet. Bacon, the only flesh which perhaps ever came within his reach, is the single exception.—TRENCH'S *Study of Words.*

MODE OF PLACING BOOKS IN ANCIENT LIBRARIES.

It may not be known to those who are not accustomed to meet with old books in their original bindings, or to seeing public libraries

of antiquity, that the volumes were formerly placed on the shelves with the leaves, not the back, in front; and that the two sides of the binding were joined together with neat silk or other strings, and in some instances, when the books were of greater value and curiosity than common, even fastened with gold or silver chains.—PHILIP BLISS, *Oxon.*

THE ALEXANDRIAN LIBRARY.

This celebrated collection is supposed to have been the largest collection which was ever brought together before the invention of printing, and is stated to have amounted to 700,000 volumes, a number which has been often doubted. It is not, however, so generally known that the rolls (*volumina*) here spoken of, contained far less than a printed volume; for instance, the *Metamorphoses* of Ovid, in fifteen books, would make fifteen volumes; and one Didymus is said by Athenæus to have written 3,500 volumes. This consideration will bring the number assigned, at least, within the bounds of credibility.

PAPYRUS.

Pliny is in error in saying that papyrus was not used for paper before the time of Alexander the Great; for papyri of the most remote Pharaonic period are found with the same mode of writing as that of the age of Cheops. (*Wilkinson*, vol. iii., p. 50.) A papyrus now in Europe, of the date of Cheops, establishes the early use of written documents, and the antiquity of paper made of the byblus long before the time of Abraham. As papyrus was expensive, few documents of that material are found, and these are generally rituals, sales of estates, and official papers. Papyrus was used until about the seventh century of our era. A soldier's leave of absence has been discovered written upon a piece of broken earthenware.—Dr. KITTO's *Cyclopædia of Biblical Literature.*

THE OLDEST ENGLISH PRINTED BOOK.

Bartholomæus de Glanville, who flourished about the middle of the fourteenth century, wrote *De Proprietatibus rerum*, which was first printed in folio by Caxton in 1480. It was translated into English by Trevisa, and printed by Wynkin de Worde in 1507. Dr. Dibdin, in his *Typographical Antiquities*, styles this "a volume of extraordinary typographical beauty and rarity." It is the first book printed on paper made in England.

LEAVES OF TREES AND BOOKS.

The use of the *liber* or inner bark of trees among the ancients is well known. In the *Philosophical Transactions* Sir John Clerk says: "The most ancient sort of charta (or paper) was of the inner bark of tree, called *liber* in Latin, whence a book had the name of *liber;* but very little of this sort is now in being." Hence the term *leaf* was first applied to paper, from leaves, especially of palms, formerly used for writing on. Thus we as familiarly speak of the leaf of a book as the leaf of a tree.

EARLY PRINTING.

In the infancy of the art its results were comparatively very rude. The type used was intended to imitate writing, and partook of the character of gothic and script. In punctuating, they employed no marks at first other than the period and colon; an oblique stroke was afterwards introduced, and fulfilled the purpose of our comma. Pages had neither running title nor number. The divisions of words and sentences were very imperfect, and the language was not divided into paragraphs. Capital letters were not used to commence a sentence, nor in proper names. No rules seem to have regulated their orthography, which was entirely without method, and their abbreviations were so numerous as to cause the necessity, in time, of publishing a book, by the directions in which they could be read. But one kind of letter was used throughout. A space was left at the beginning of chapters for the illuminator, who wrote in various colored ink the initial letter. These were often elaborately ornamented, and very costly, being embellished with flowers and figures, and sometimes variegated with gold and silver. The first presses were fashioned after the common wine-press. For a short time the paper was printed on but one side, the blank sides being pasted together. The only forms of books were the folio and quarto. Two or three hundred copies were then considered a large edition. Dates were often omitted, and the name of the printer, when given, was placed at the end of the book.—*Quoted in Publishers' Circular.*

SCRIBES AND LIBRARIES IN THE MIDDLE AGES.

In most monasteries there were two kinds of Scriptoria, or writing offices; for in addition to the large and general apartment used for the transcription of church books and manuscripts for the library, there were also several smaller ones occupied by the superiors and the more

learned members of the community, as closets for private devotion and study. Thus we read that in the Cistercian orders there were places set apart for the transcription of books called Scriptoria, or cells assigned to the scribes, "separate from each other," where the books might be transcribed in the strictest silence, according to the holy rules of their founders. These little cells were usually situated in the most retired part of the monastery, and were probably incapable of accommodating more than one or two persons; dull and comfortless places no doubt, yet they were deemed great luxuries, and the use of them only granted to such as became distinguished for their piety or erudition. The aged monks, who often lived in these little offices, separate from the rest of the scribes, were not expected to work so arduously as the rest. Their employment was comparatively easy; nor were they compelled to work so long as those in the cloister. There is a curious passage in Tangmar's Life of St. Bernard, which would lead us to suspect that private individuals possessed Scriptoria; for, says he, there are Scriptoria not only in the monasteries but in other places, in which are conceived books equal to the divine works of the philosophers. The Scriptorium of the monastery in which the general business of a literary nature was transacted, was an apartment far more extensive and commodious, fitted up with forms and desks methodically arranged, so as to contain conveniently a great number of copyists. In some of the monasteries and cathedrals, they had long ranges of seats one after another, at which were seated the scribes, one well versed in the subject on which the book treated, recited from the copy whilst they wrote; so that, on a word being given out by him, it was copied by all. The multiplication of manuscripts, under such a system as this, must have been immense; but they did not always make books, *fecit libros*, as they called it, in this wholesale manner, but each monk diligently labored at the transcription of a separate work.

The amount of labor carried on in the Scriptorium, of course, in many cases depended upon the revenues of the abbey, and the disposition of the abbot; but this was not always the case, as in some monasteries they undertook the transcription of books as a matter of commerce, and added broad lands to their house by the industry of their pens. But the Scriptorium was frequently supported by resources solely applicable to its use. Laymen, who had a taste for literature, or who entertained an esteem for it in others, often, at their death, bequeathed estates for the support of the monastic Scriptoria.

The abbot superintended the management of the Scriptorium, and decided upon the hours for their labor, during which time they were

ordered to work with unremitting diligence, "not leaving to go and wander in idleness," but to attend solely to the business of transcribing. To prevent distraction or interruption, no one was allowed to enter except the abbot, the prior, the sub-prior, and the armarian; as the latter took charge of all the materials and implements used by the transcribers, it was his duty to prepare and give them out when required; he made the ink, and cut the parchment ready for use. He was strictly enjoined, however, to exercise the greatest economy in supplying these precious materials, and not to give more copies "*nec artavos, nec cultellos, nec scarpellæ, nec membranes*," than was actually necessary, or than he had computed as sufficient for the work; and what the armarian gave them the monks were to receive without contradiction or contention.

The utmost silence prevailed in the Scriptorium, rules were framed, and written admonitions hung on the walls, to enforce the greatest care and diligence in copying exactly from the originals. In Alcuin's works, we find one of these preserved; it is a piece inscribed, "*Ad Musæum libros scribentium.*"

Other means were resorted to besides these to preserve the text of their books immaculate; it was a common practice for the scribe at the end of his copy, to adjure all who transcribed from it to use the greatest care, and to refrain from the least alteration of word or sense. Authors more especially followed this course; thus at the end of some we find such injunctions as this:

"I adjure you who shall transcribe this book, by our Lord Jesus Christ and by His glorious coming, who will come to judge the quick and the dead, that you compare what you transcribe, and diligently correct it by the copy from which you transcribe it—this adjuration also—and insert it in your copy."

The Consuetudines Canonicorum, before referred to, also particularly impressed this upon the monks, and directed that all the brothers who were engaged as scribes, were not to alter any writing, although in their own mind they might think it proper, without first receiving the sanction of the abbot, "*on no account were they to commit so great a presumption.*" But notwithstanding that the scribes were thus enjoined to use the utmost care in copying books, doubtless an occasional error crept in, which many causes might have produced, such as bad light, haste, a little drowsiness, imperfect sight, or even a flickering lamp, was sufficient to produce some trivial error; but in works of importance the smallest error is of consequence, as some future scribe, puzzled by the blunder, might, in an attempt to correct, still more

augment the imperfection; to guard against this, with respect to the Scriptures, the most critical care was enforced. Monks advanced in age were alone allowed to transcribe them, and after their completion they were read, revised, and re-read again, and it is by that means so uniform a reading has been preserved; and although slight differences may here and there occur, there are no books which have traversed through the shadows of the dark ages that preserve their original text so pure and uncorrupt as the copies of the Scriptures, the Fathers of the Church, and the ancient writings of the classic authors; sometimes, it is true, a manuscript of the last order is discovered possessing a very different reading in some particular passage; but these appear rather as futile emendations or interpolations of the scribe than as the result of a downright blunder, and are easily perceivable; for when the monkish churchmen tampered with ancient copies, it generally originated in a desire to smooth over the indecencies of the heathen authors, and so render them less liable to corrupt the holy contemplations of the devotee; and while we blame the pious fraud, we cannot but respect the motive that dictated it.

But as regards the Scriptures, we talk of the carelessness of the monks and the interpolations of the scribes as if these were faults peculiar to the monastic ages alone; alas! the history of Biblical transmission tells us differently; the gross perversions, omissions, and errors wrought in the holy text, proclaim how prevalent these same faults have been in the ages of *printed literature*, and which appear more palpable by being produced amidst deep scholars, and surrounded with all the critical acumen of a learned age. Five or six thousand of these gross blunders, or these wilful mutilations, protest the unpleasant fact, and show how much of human grossness it has acquired, and how besmeared with corruption those sacred pages have become in passing through the hands of man, and the "revisings" of sectarian minds.

The Bible was an expensive book, but can scarcely be regarded as a rare one; the monastery was indeed poor that had it not, and when once obtained the monks took care to speedily transcribe it. Sometimes they only possessed detached portions, but when this was the case, they generally borrowed of some neighboring and more fortunate monastery, the missing parts to transcribe, and so complete their own copies.

I do not pretend to say that the Bible was a common book among them, or that every monk possessed one—far different indeed was the case; a copy of the Old and New Testament often supplied the wants

of an entire monastery, and in others, only some detached portions were to be found in their little libraries. Sometimes they were more plentiful, and the monastery could boast of two or three copies, besides a few separate portions; and occasionally I have met with instances where, besides several *Biblia Optima*, they enjoyed Hebrew codices and translations, with numerous copies of the Gospels. We must not forget, however, that the transcription of a Bible was a work of time, and required the outlay of much industry and wealth. "Brother Tedynton," a monk of Ely, commenced a Bible in 1396, and was several years before he completed it. The magnitude of the undertaking can scarcely be imagined by those unpractised in the art of copying. Kings and nobles offered the Bible as an appropriate and generous gift, and bishops were deemed benefactors to their church by adding it to the library. On its covers were written earnest exhortations to the Bible student, admonishing the greatest care in its use, and levelling anathemas and excommunications upon any who should dare to purloin it. For its greater security, it was frequently chained to a reading desk, and if a duplicate copy was lent to a neighboring monastery, they required a large deposit, or a formal bond, for its safe return. These facts, while they show its value, also prove how highly it was esteemed among them, and how much the monks loved the Book of Life.—*Bibliomania in the Middle Ages.*

BOOKSELLERS IN THE MIDDLE AGES.

The secular copyists were an important class during the middle ages, and supplied the functions of the bibliopole of the ancients. But the transcribing trade numbered three or four distinct branches. There were the Librarii, Antiquarii, Notarii, and the Illuminators—occasionally these professions were all united in one, where perseverance or talent had acquired a knowledge of these various arts. There appears to have been considerable competition between these contending bodies. The notarii were jealous of the librarii, and the librarii, in their turn, were envious of the antiquarii, who devoted their ingenuity to the transcription and repairing of old books especially, rewriting such parts as were defective or erased, and restoring the dilapidations of the binding. Being learned in old writings, they corrected and revised the copies of ancient codices: of this class we find mention as far back as the time of Cassiodorous and Isidore. "They deprived," says Astle, "the poor librarii, or common scriptores, of great part of their business, so that they found it difficult to gain a subsistence for themselves and their families. This put

them about finding out more expeditious methods of transcribing books. They formed the letters smaller, and made use of more conjugations and abbreviations than had been usual. They proceeded in this manner till the letters became exceedingly small and extremely difficult to be read." The fact of there existing a class of men, whose fixed employment or profession was solely confined to the transcription of ancient writings and to the repairing of tattered copies, in contradistinction to the common scribes, and depending entirely upon the exercise of their art as a means of obtaining a subsistence, leads us to the conclusion that ancient manuscripts were by no means so very scarce in those days; for how absurd and useless it would have been for men to qualify themselves for transcribing these antiquated and venerable codices if there had been no probability of obtaining them to transcribe. The fact, too, of its becoming the subject of so much competition proves how great was the demand for their labor.

We are unable, with any positive result, to discover the exact origin of the secular scribes, though their existence may probably be referred to a very remote period. The monks seem to have monopolized for some ages the "*Commercium Librorum*," and sold and bartered copies to a considerable extent among each other. We may with some reasonable grounds, however, conjecture that the profession was flourishing in Saxon times; for we find several eminent names in the seventh and eighth centuries who, in their epistolary correspondence, beg their friends to procure transcripts for them. At a subsequent period, the extent and importance of the profession grew amazingly; and in Italy its followers were particularly numerous in the tenth century, as we learn from the letters of Gerbert, afterwards Sylvester II., who constantly writes, with the cravings of a biblio-maniac, to his friends for books, and begs them to get the scribes, who, he adds, in one of his letters, may be found in all parts of Italy, both in town and in the country, to make transcripts of certain books for him, and he promises to reimburse his correspondent all that he expends for the same.

These public scribes derived their principal employment from the monks and the lawyers; from the former, in transcribing their manuscripts, and by the latter in drawing up their legal instruments. They carried on their avocation at their own homes, like other artisans; but sometimes, when employed by the monks, executed their transcripts within the cloister, where they were boarded, lodged, and received their wages till their work was done. This was especially the case when some great book was to be copied, of rarity and price.

The increase of knowledge and the foundation of the universities gave birth to the booksellers. Their occupation as a distinct trade originated at a period coeval with the foundation of these public seminaries, although the first mention that I am aware of is made by Peter of Blois, about the year 1170. The casual way in which he speaks of it shows that the "*publico mangone librorum*" was no unusual personage in those days, but belonged to a common and recognized profession.

The vast number of students who were congregated together by the foundation of the universities, generated, of course, a proportionate demand for books; and soon for various cogent reasons the universities obtained the royal sanction to take the trade under their protection, and eventually monopolized a sole legislative power over the *librarii.*

The nature of a bookseller's business in those days required no ordinary capacity and no shallow store of critical acumen; the purchasing of manuscripts, the work of transcription, the careful revisal, the preparation of materials, the tasteful illuminations, and the process of binding, were each employments requiring some talent and discrimination, and we are not surprised, therefore, that the avocation of a dealer and fabricator of these treasures should be highly regarded, and dignified into a profession, whose followers were invested with all the privileges, freedoms, and exemptions which the masters and students of the University enjoyed. But it required these conciliations to induce them to submit to the restrictive measures which she imposed on the trade. For whilst the university of Paris encouraged and elevated the profession of librarii, she required on the other hand a guarantee of their wealth and mental capacity to maintain and to appreciate these important concessions; the bookseller was expected indeed to be well versed in all branches of science, and to be thoroughly imbued with a knowledge of those subjects and works of which he undertook to produce transcripts. She, moreover, required of him testimonials to his good character, an efficient security, ratified by a solemn oath of allegiance, and a promise to observe and submit to all the present and future laws and regulations of the university. In some cases, it appears that she restricted the number of librarii, though this fell into disuse as the wants of the students increased. Twenty-four seems to have been the original number, which is sufficiently great to lead to the conclusion that bookselling was a flourishing trade in those old days. By the statutes of the university, the bookseller was not allowed to expose his transcripts for sale without first submitting them to the inspection

of certain officers appointed by the university; and if an error was discovered, the copies were ordered to be burnt, or a fine levied on them, proportionate to their inaccuracy.

In these times of free trade and unrestrained commercial policy, we shall regard less favorably a regulation which they enforced at Paris, depriving the bookseller of the power of fixing a price upon his own goods. Four booksellers were appointed and sworn in to superintend this department, and when a new transcript was finished, it was brought by the bookseller, and they discussed its merits and fixed its value, which formed the amount the bookseller was compelled to ask for it; if he demanded of his customer a larger sum, it was deemed a fraudulent imposition, and punishable as such. Moreover, as an advantage to the students, the bookseller was expected to make a considerable reduction in his profits in supplying them with books: by one of the laws of the university, his profit on each volume was confined to four deniers to a student, and six deniers to a common purchaser. The librarii were still further restricted in the economy of their trade, by a rule which forbade any one of them to dispose of his entire stock of books without the consent of the university; but this, I suspect, implied the disposal of the stock and trade together, and was intended to intimate that the introduction of the purchaser would not be allowed without the cognizance and sanction of the university. Nor was the bookseller able to purchase books without her consent, lest they should be of an immoral or heretical tendency; and they were absolutely forbidden to buy any of the students without the permission of the rector.

But restricted as they thus were, the book merchants nevertheless grew opulent, and transacted an important and extensive trade; sometimes they purchased parts and sometimes they had whole libraries to sell. Their dealings were conducted with unusual care, and when a volume of peculiar rarity or interest was to be sold, a deed of conveyance was drawn up with legal precision in the presence of authorized witnesses.

In those days of high prices and book scarcity, the poor student was sorely impeded in his progress; to provide against these disadvantages, they framed a law in 1342, at Paris compelling all public booksellers to keep books to lend out on hire. The reader will be surprised at the idea of circulating a library in the Middle Ages!—but there can be no doubt of the fact; they were established at Paris, Toulouse, Vienna, and Bologne. These public librarians, too, were obliged to write out regular catalogues of their books and hang them up in

their shops, with the prices affixed, so that the student might know beforehand what he had to pay for reading them.

This rate of charge was also fixed by the university, and the students borrowing these books were privileged to transcribe them if they chose; if any of them proved imperfect or faulty, they were denounced by the university, and a fine imposed upon the bookseller who had lent out the volume.

This potent influence exercised by the universities over booksellers, became, in time, much abused; and in addition to these commercial restraints, they assumed a still less warrantable power over the original productions of authors, and became virtually the public censors of books, and had the power of burning or prohibiting any work of questionable orthodoxy. In the time of Henry the Second, a book was published by being read over for two or three successive days before one of the universities, and if they approved of its doctrines and bestowed upon it their approbation, it was allowed to be copied extensively for sale.

Stringent as the university rules were, as regards the bookselling trade, they were, nevertheless, sometimes disregarded or infringed; some ventured to take more for a book than the sum allowed, and, by prevarication and secret contracts, eluded the vigilance of the laws. Some were still bolder, and openly practised the art of a scribe and the profession of a bookseller, without knowledge or sanction of the university. This gave rise to much jealousy, and in the University of Oxford, in the year 1373, they made a decree, forbidding any person exposing books for sale without her license.

Now, considering all these usages of early bookselling, their numbers, their opulence, and above all, the circulating libraries which the librarii established, can we still retain the opinion that books were so inaccessible in those ante-printing days, when we know that for a few sous the book-lover could obtain good and authenticated copies to peruse or transcribe? It may be advanced that these facts solely relate to universities, and were intended merely to insure a supply of the necessary books in constant requisition by the students, but such was not the case; the librarii were essentially public *Librorum Venditores*, and were glad to dispose of their goods to any who could pay for them. Indeed the early bibliomaniacs usually flocked to these book marts to rummage over the stalls, and to collect their choice volumes. Richard de Bury obtained many in this way, both at Paris and at Rome.

Of the exact pecuniary value of books during the Middle Ages we

have no means of judging. The few instances that have accidentally been recorded are totally inadequate to enable us to form an opinion. The extravagant estimate given by some, as to the value of books in those days, is merely conjectural, as it necessarily must be, when we remember that the price was guided by the accuracy of the transcription, the splendor of the binding, which was often gorgeous to excess, and by the beauty and richness of the illuminations. Many of the manuscripts of the Middle Ages are magnificent in the extreme. Sometimes they inscribed the Gospels and the venerated writings of the Fathers with liquid gold, on parchment of the richest purple, and adorned its brilliant pages with illuminations of exquisite workmanship.—*Bibliomania in the Middle Ages.*

BOOKWORMS.

In paper, leather and parchment are found various animals, popularly known as "Bookworms." The larvæ of *Crambus pinguinalis* will establish themselves upon the binding of a book, and, spinning a robe, will do to it little injury. A mite (*Acarus eruditus*) eats the paste that fastens the paper over the edges of the binding, and so loosens it. The caterpillar of another little moth takes its station in damp old books, between the leaves, and there commits great ravages. The little boring wood-beetle also attacks books, and will even bore through several volumes. An instance is mentioned of twenty-seven folio volumes being perforated, in a straight line, by the same insect, in such a manner that, by passing a cord through the perfect round hole made by it, the twenty-seven volumes could be raised at once. The wood-beetle also destroys prints and drawings, whether framed or kept in a portfolio. "The Death-watch" is likewise accused of being a depredator of books. These details were collected by the experienced keeper of the Ashmolean Museum at Oxford, in 1841.

It seems now clear that there are many insect depredators upon books. There is the *Hypothenemus Eruditus*, that eats leather, and the *Anobium striatum*, that eats the paper. They eat in their larva state, and are therefore rarely caught. One of these depredators is described as about fifteen-hundredths of an inch long, and rather narrow in proportion.

ATTEMPT TO PRINT A PERFECT BOOK.

"Whether such a miracle as an immaculate edition of a classical author does exist," says one, "I have never learnt; but an attempt

has been made to obtain this glorious singularity, and was as nearly realized as is perhaps possible—the magnificent edition of *Os Lusiadas* of Camoens by Don Joze Souza, in 1817. This amateur spared no prodigality of cost and labor, and flattered himself that, by the assistance of Didot, not a single typographical error should be found in that splendid volume. But an error was afterwards discovered in some of the copies, occasioned by one of the letters in the word *Lusitano* having got misplaced during the working of one of the sheets. It must be confessed that this was an accident or misfortune, rather than an erratum!"

The celebrated Foulises, of Glasgow, attempted to publish a work which should be a perfect specimen of typographical accuracy. Every precaution was taken to secure the desired result. Six experienced proof-readers were employed, who devoted hours to the reading of each page; and after it was thought to be perfect, it was posted up in the hall of the university, with a notification that a reward of fifty pounds would be paid to any person who could discover an error. Each page was suffered to remain two weeks in the place where it had been posted, before the work was printed, and the printers thought that they had attained the object for which they had been striving. When the work was issued, it was discovered that several errors had been committed, one of which was in the first line of the first page. The Foulis' editions of classical works are still much prized by scholars and collectors.—*Cyclopædia of Literary and Scientific Anecdote.*

NUMBER OF BOOKS IN THE WORLD.

D'Israeli, in his *Curiosities of Literature*, states that the four ages of typography have produced no less than 3,641,960 works! Taking each work at three volumes, and reckoning each impression to consist of only 300 copies (a very moderate supposition), the actual amount of volumes which have issued from the presses of Europe, down to the year 1816, appears to be 3,277,640,000. Between the years 1474 and 1600, it has been estimated about 350 printers flourished in England and Scotland, and that the products of their several presses amounted in the aggregate to 10,000 distinct productions.

CODEX VATICANUS.

Mr. Arthur Ashpitel, in a recent letter to the London Times, gives some interesting particulars concerning the present condition of the Codex Vaticanus, probably the oldest Greek manuscript of the Scrip-

tures extant. He states that early in 1854, he saw it in the possession of the celebrated scholar Cardinal Angelo Mai, who was carefully editing it, but who subsequently died leaving his work unfinished. It was formerly separated into two volumes, but now forms one thick octavo; it is incomplete both at the beginning and the end, having lost about half the book of Genesis and nearly all the Apocalypse; the latter, however, has been supplied by another hand in Cursive Greek of the date probably of the tenth century. It contains one or two of the smaller books of the Apocrypha, but not the books of the Maccabees. The Gospels and Epistles seemed tolerably complete. The celebrated verse in the First Epistle of St. John, as is well known, is not in the text, and Mr. Ashpitel saw nothing of the Epistles of Barnabas, Polycarp, Clemens Romanus, the Pastor of Hermas, nor any of the writings of that period. Cardinal Mai was of the opinion that this manuscript was consulted by the celebrated Ximenes in the preparation of his Polyglot version. He thought the manuscript could not be of later date than the middle of the second century.

Mr. Tregilles in a subsequent number of the Times gives additional particulars. The Codex bears no marks of intentional mutilation, but the Epistles of St. Paul to Timothy, Titus, and Philemon, are wholly wanting, as well as the Apocalypse so far as the ancient writing is concerned, but this arises from the loss of both ends of the manuscript, so that the greater part of Genesis is gone, and the old writing breaks off in Hebrews ix., and as the pastoral epistles in the arrangement of the old Greek MSS. stand after that to the Hebrews, they are thus of a necessity wanting. Not so, however, the Catholic Epistles, which occupy their usual Greek location after the Acts and before Romans. The later hand has supplied the missing part of Genesis, and inserted a portion lost from the Psalms, and added the latter part of Hebrews and Revelations. It has been proposed, if permission can be obtained, to make a photograph copy of this Codex, but there are many difficulties in the way.

THE ENGLISH BIBLE.

The English version of the Scriptures now in use, is itself the result of repeated revisions. In the preface to the Bishop's Bible (A. D. 1568) a distinct reference is made to early Saxon versions, and there are still extant, parts of the Bible in Saxon, translated by Bede, by Alfred the Great, and by Ælfric of Canterbury. Early Saxon MSS. of the Gospels are still preserved in the libraries of the British Museum, and Corpus Christi College, Cambridge. The first complete translation of

the Bible was made by *Wycliffe*, about A. D. 1380. It existed only in MS. for many years, but the whole is now in print (New Testament, 1731; Old Testament, 1848). The work was regarded with grave suspicion; and a bill was introduced into the House of Lords for suppressing it; but through the influence of John O'Gaunt, this was rejected. In 1408, however, in a convocation held at Oxford, it was resolved that no one should translate any text of Scripture into English, as a book or tract, and that no book of the kind should be read. This resolution led to great persecution, though there is reason to believe, that notwithstanding, many MSS. of Scripture were at that time in extensive circulation throughout England. The first *printed* edition of the Bible in English, was published by *Tyndale*, the New Testament in 1526, and the Bible in part, in 1532. Tonstall, Bishop of London, and Sir Thomas More, took great pains to buy up and burn the impression, but with the effect, thereby, of enabling the translator to publish a larger and improved edition. On the death of Tyndale, Miles Coverdale revised the whole, and dedicated it to King Henry the 8th, A. D. 1535, and in 1537, *John Rogers*, who had assisted Tyndale, and was then residing at Antwerp, reprinted an edition, taken from Tyndale and Coverdale. This edition was published under the assumed name of *Thomas Matthews*. A revision of this edition again was published (A. D. 1539), by *Richard Taverner*. The *Great Bible* appeared A. D. 1539. It was Coverdale's, revised by the translator, under the sanction of Cranmer. It was printed in large folio. For the edition of 1540, Cranmer wrote a preface, and it is hence called *Cranmer's* Bible. It was published "by authority." During the seven years of king Edward's (VI.) reign, eleven editions of the Scriptures were printed: but no new version or revision was attempted. During the reign of Mary, was published the *Geneva* Bible, A. D. 1557–60: Coverdale and others who had taken refuge in Geneva, edited it, and added marginal annotations. Archbishop Parker obtained authority from Queen Elizabeth, to revise the existing translations, and with the help of various bishops and others, published in 1568 what was called *the Bishops' Bible*. It contains short annotations, and in the smaller editions (from 1589,) the text is divided, like the Genevan, into verses. The same text was afterwards printed (in 1572) in a large size, and with various prefaces, under the name of *Matthew Parker's* Bible. It continued in common use in the churches for forty years, though the Genevan Bible was perhaps more read in private. The *Rhemish* New Testament, and the *Douay* Old Testament, form the English Bible of the Romanists. The former was printed at

Rheims (A. D. 1582), and the latter at Douay (A. D. 1609–10). In 1606, King James resolved on a revision of the translation, and for this purpose appointed fifty-four men of learning and piety. Forty-seven only undertook the work, and in four years (from 1607–11) it was completed. The text as thus prepared and printed in 1611, is the *authorized version.—Bible Hand-Book by Augus.*

HOW TYNDALE'S BIBLE WAS FIRST PRINTED IN ENGLAND.

At this time printing was executed much better at Paris than in London; and, owing to a singular conjunction of circumstances, Thomas Cromwell got a license for Grafton and Whitchurch to print the Bible *there*. The work was, however, interrupted by the Inquisition; when not only the sheets, but the types and printers, were carried to England, to the great improvement of the art there. The Bible was soon finished, and ordered to be set up in every church in the kingdom; and the priests were forbidden to hinder the people from reading it there on pain of deprivation. And thus were fulfilled the words of Tyndale the martyr: "If God spare my life, ere many years, *I will cause a boy that drives the plough to know more of the Scriptures than you do.*" After the edition of 1539 there were four others of the large Bible, printed at the expense of 30,000*l*., advanced by Antony Marler, a citizen of London, who obtained an order to have them set up in the churches. The price was fixed by authority at 7*l*. 10*s*., and for the bound copies 9*l*. During the reign of Edward VI. Tyndale's Bible was printed more than thirty times, while of that with Cranmer's revision, only half the number was called for. The first Scottish Edition of the Scriptures was published at 4*l*. 13*s*., 4*d*., and yet the Bible was in almost every house!—*North British Review*, No. 9.

REMUNERATION OF AUTHORS.

The following table shows the prices paid to some celebrated authors for the copyrights of their works. In the case of plays the price of the copyright alone is given, no account being taken of the oftentimes greater remuneration accruing from their performance upon the stage.

Wanderer, by Savage, £10 10*s*. Fables by Dryden, £250. Beggar's Opera, by Gay, £400. Poems by Gay, £1000. Edition of Shakspeare by Pope, £217 12*s*. Tales from Shakspeare, by Chas. Lamb, £63. Contributions for two years, to London Magazine, by Chas. Lamb,

£170. Exchange no Robbery, by Theodore Hook, £60. Sayings and Doings, 1st series, by Hook, £600. Sayings and Doings, 2d series, by Hook, £1400. Sayings and Doings, 3d series, by Hook, £1050. Births, Deaths, and Marriages, by Hook, £600. Editorship of Colburn's New Monthly, by Hook, £400 per annum. Rejected Addresses, by J. & H. Smith, £131 after 16th edition. Country Cousins, Trip to Paris, Air Ballooning, Trip to America, by James Smith, £100. Wife of Bath, £25. Letter to a Lady, £6 7½*s.* The What-d'ye-call-it, £16 2½*s.* Trioia, £43. Epistle to Earl of Burlington, £10 15*s.* Battle of Frogs, £16 2½*s.* Three Hours of Marriage, £43 2½*s.* Revival of the Wife of Bath, £75. The Mohawks, £2 10*s.*; all by Gay. Pope received for Statues, 1st book, and Vertumnus and Pomona, £16 2½*s.* First edition of the Rape, £7. Windsor Forest, £32. 5*s.* Ode to St. Cecilia's Day, £15. Addition to the Rape, £15. Homer, vol. 1. £215. besides 650 copies at £176. Temple of Fame, £32 5*s.* Key to the Loch, £10 15*s.* Homer, vols 2, and 3, £215 each, besides £150 each for copies. Essay on Criticism, £15. Homer, vols. 4, 5, 6, £210 each, and £150 each for copies. Parnell's Poems, £15. Copy money for the first three volumes of the Odyssey, and 750 copies of each, £616. Copy money for vols. 4 and 5; 750 copies of each £425 18*s.* 7½*d.* Besides this Pope received £840 additional on his Homer, making for his works between 1712 and 1721, £4244 8*s.* 7½*d.* Fragments of History, by Charles Fox, sold by Lord Holland, for 5000 guineas. Fragments of History, by Sir James Mackintosh, £500. Lingard's History of England, £4683. Sir Walter Scott's Bonaparte was sold, with the printed books, for £18,000; the net receipts of copyright on the first two editions only must have been £10,000. Life of Wilberforce, by his sons, 4000 guineas. Life of Byron, by Moore, £4000. Life of Sheridan, by Moore, £2000. Life of Hannah More, £2000. Life of Cowper, by Southey, £1000. Life and times of George IV., by Lady C. Bury, £1000. Byron's Works, £20,000. Lord of the Isles, half share, £1500. Lalla Rookh, by Moore, £3000. Rejected Addresses, by Smith, £1000. Crabbe's Works, republication of, by Mr. Murray, £3000. Wordsworth's Works, republication of, by Mr. Moxon, £1050. Bulwer's Rienzi, £1600. Marryat's Novels, £500 to £1500 each. Trollope's Factory Boy, £1800. Hannah More derived £30,000 per annum for her copyrights, during the latter years of her life. Rundell's Domestic Cookery, £2000. Nicholas Nickleby, £3000. Eustace's Classical Tour, £2100. Sir Robert Inglis obtained for the beautiful and interesting widow of Bishop Heber, by the sale of his Journal, £5000.—*Cyclopædia of Literary and Scientific Anecdote.*

BRIDGEWATER TREATISES.

These celebrated works derive their name from the Rev. Francis Henry Egerton, Earl of Bridgewater, who died in February, 1829, and by his will, dated Feb. 25, 1825, directed certain trustees to invest £8000 to be placed at the disposal of the President of the Royal Society, to be paid to the person or persons nominated by him. The testator directed that the person or persons so selected, should be appointed to write and publish one thousand copies of a work, "on the Power, Wisdom, and Goodness of God, as manifested in the creation, illustrating each work by all reasonable arguments; as, for instance, the variety and formation of God's creatures in the animal, vegetable, and mineral kingdoms; the effects of digestion, and thereby of conversion; the construction of the hand of man, and an infinite variety of other arguments: as also by discoveries, ancient and modern, in Arts and Sciences and the whole extent of Literature." The President of the Royal Society was then David Gilbert, and he, with the advice of the Archbishop of Canterbury, and the Bishop of London, appointed the following eight gentlemen, who wrote the "Bridgewater Treatises:" Dr. Chalmers, John Kidd, Rev Mr. Whewell, Sir. Chas. Bell, Peter Mark Roget, Rev. Dr. Buckland, Rev. Wm. Kirby, and Wm. Prout.

HORNBOOKS.

It is difficult to conceive how tedious must have been the teaching of little children by such rude means as the Hornbook common in the last century. A specimen met with in 1850, among the old stock of a bookseller at Petersborough, in Lincolnshire, is thus described: Its dimensions are 9 by 5 inches. The alphabet, &c., are printed upon white paper, which is laid upon a thin piece of oak, and is covered with a sheet of horn, secured in its place by eight tacks, driven through a border or mounting of brass; the object of this horn-covering being to keep the "book," or rather leaf, unsoiled. The first line is the cross-row; so named, says Johnson, "because a cross is placed at the beginning, to show that the end of learning is piety." Shakspeare has a reference to this line:

> "He hearkens after prophecies and dreams;
> And from the cross-row plucks the letter G;
> And says, a wizard told him that by G
> His issue disinherited should be." *Richard III.*

Another specimen, which is at least as old as 1570, is described as having a large cross, the *criss-cross*, and then the alphabet in large and small letters. The vowels follow next, and their combinations

with the consonants; and the whole is concluded with the Lord's Prayer and the *Roman* numerals. The Arabic numerals are not given.

Some horn-books were printed on horn only, or pasted to its back.

ORIGIN OF NEWSPAPERS.

The Newspaper was long stated to have originated in Venice, in 1563, and to have been called *Gazetta*, whence our appellation Gazette. This was, however, an error; for the Venetian newspaper was a written sheet, for hearing which read, each person paid a *gazetta*, a coin no longer in use. The paper was, in fact, called "*A particular Relation*," a title borne by many English newspapers of the seventeenth century.

WHO WROTE "DE IMITATIONE CHRISTI?"

The following reply is a condensed note from Brunet's *Manual du Libraire*, vol. ii.:

Who is the true author of the *Imitatio?* Two centuries of dispute on this subject have not been able to inform us; and more than one hundred and twenty works, written to throw light on the question, have only served to render the solution more difficult.

The more ancient testimonies appear favorable to Jean Gerson, chancellor of the church of Paris; but, on the other hand, Thomas à Kempis counts numerous partisans. The defenders of these two competitors have triumphantly refuted those persons who have wished to bring forward Jean Gerson, Abbé of Verceil, who lived in the thirteenth century, as the author of the *Imitatio;* and after that, we cannot admit this last combatant.

Such is moreover the opinion of Mr. Gence, an industrious scholar, who has made a particular study of every thing which relates to this subject, and who has published *Considerations on the Question relative to the Author of the 'Imitation.'*

DERIVATION OF WORDS.

There is a rule that holds pretty constantly good, by which you may generally determine whether an obviously Latin word is derived directly from that language, or only mediately through the French. It is this,—that if a word be directly from the Latin, it will not have undergone any alteration or modification in its form and shape, save only as respects the termination. 'Innocentia' will have become 'in-

nocency,' 'natio' will have become 'nation,' 'firmamentum' will have become 'firmament,' but nothing more. On the other hand, if it comes *through* the French, it will generally be considerably altered in its passage. It will have undergone a process of lubrication; its sharply defined Latin outline will in good part have departed from it; thus 'crown' is from 'corona,' but through 'couronne,' and itself a dissyllable, 'coronne,' in our earlier English; 'treasure' is from 'thesaurus,' but through 'tresor,' 'emperor' is the Latin 'emperator,' but it was first 'empereur.' It will not at all uncommonly happen that the substantive has passed to us through this process, having come through the intervention of the French; while we have only felt at a later period our want of the adjective also, which we have proceeded to borrow direct from the Latin. Thus 'people' is indeed 'populous,' but it was 'peuple' first, while 'popular' is a direct transfer of a Latin vocable into our English glossary. So, too, 'enemy' is 'inimicus,' but it was first softened in the French and had its Latin physiognomy to a great degree obliterated, while 'inimical' is Latin throughout; 'parish' is 'paroisse,' but 'parochial is 'parochialis.'

Sometimes you will find in English what I may call a double adoption of a Latin word; I mean that we have many Latin words which now make part of our vocabulary in two shapes, in both of these forms, directly from the Latin, and mediately through the French. In these cases it will be particularly noticeable how that which has come through the French has been shaped and moulded, generally cut short, often cut a syllable or two shorter (for the French devours letters and syllables) than the Latin. I will mention a few examples; 'secure' and 'sure,' both from the Latin 'securus,' but one directly, the other through the French; 'granary' and 'garner;' 'tradition' and 'treason;' 'hospital' and 'hotel;' 'faction' and 'fashion;' 'redemption' and 'ransom;' 'potion' and 'poision.' In naming these I have ever named the Latin form before the French; but the reverse is in almost every case the order in which the words were adopted by us.—TRENCH, *on English Past and Present.*

INTRODUCTION OF FOREIGN WORDS INTO OUR LANGUAGE.

The first great augmentation by foreign words of our vocabulary was a consequence, although not an immediate one, of the battle of Hastings, and of the Norman domination which Duke Williams's victory established in our land. But the actual interpenetration of our Anglo-Saxon with any large amount of French words, did not find place till very considerably later than this event. Some French words

we find very soon after; but in the main the two streams of language continued for a long while separate and apart. I consider the great period of the incoming of French words into the English language to have been when the Norman nobility were exchanging their own language for the English, and I am disposed to consider Chaucer's influence in effecting this change over-estimated. He did much, but he only fell in with and furthered a tendency already existing. During the revival of classical learning, which may be dated in England about the reigns of Henry the Eighth and his immediate successors, Latin words came into the language not by single adoption, as with later writers, but in floods. A translator at the end of the sixteenth and beginning of the seventeenth century, counted it needful to explain in a sort of glossary, which he prefixes to his translation of Pliny's *Natural History*, many curious "words of art." One can hardly at the present day understand how any person, who would care to read the book at all, would find any difficulty with words like the following: 'acrimony,' 'austere,' 'bulb,' 'consolidate,' 'debility,' 'dose,' 'ingredient,' 'opiate,' 'propitious,' 'symptom,' all which, as novelties, he carefully explains. Some of the words in his glossary, it is true, are harder and more technical than these; but the vast proportion of them present no more difficulty than those which I have adduced. The period during which the naturalization of Latin words in the English language was going actively forward, may be said to have continued for about a century or more. It first received a check from the coming up of French tastes, fashions, and habits of thought with the restoration of Charles the Second. We may say of this influx of Latin that it left the language immensely increased in copiousness, with greatly enlarged capabilities, but perhaps somewhat burdened, and not always able to move gracefully under the weight of its new acquisitions. From the German language our adoptions, till within the last fifty years, were almost none, but of late they have become more frequent.—TRENCH's *English Past and Present.*

CURIOUS RETENTION OF OLD ENGLISH WORDS AND PHRASES BY THE COMMON PEOPLE.

We often hear country-people use such expressions as these: "He made me *afeard;*" "The price of corn *ris* last market-day;" "I will *axe* him his name." You would probably set these phrases down for barbarous English; but they are not at all so; in one sense they are quite as good English as: "He made me *afraid;*" "The price of corn *rose*, &c.;" " will *ask* him, &c." 'Afeard,' used by Spenser,

is the regular participle of the old verb 'to affear,' as 'afraid' is of 'to affray,' and just as good English; 'ris' or risse' is an old præterite of 'to rise;' 'to axe' is not a mispronunciation of 'to ask,' but a genuine English form of the word—the form which in the earlier English it constantly assumed; it is quite exceptional when the word appears in its other, that is, its present shape in Wiclif's Bible; and, indeed, 'axe' occurs continually, I know not whether invariably, in Tyndale's translation of the Scriptures. Even such a phrase as "Put *them* things away" is not bad, but only antiquated, English. The same may be asserted of certain ways of pronouncing words, which are now in use among the lower classes, but not among the higher, as, for example, 'contrary,' 'mischīevous,' 'blasphēmous.' It would be abundantly easy to show by a multitude of quotations from our poets, and those reaching very far down, that these are merely the retention of the earlier pronunciation by the people, when the higher classes have abandoned it.—TRENCH's *English Past and Present.*

NUMBER OF PROVINCIALISMS IN ENGLAND.

Halliwell's "Dictionary of Archaic and Provincial Words, Obsolete Proverbs and Ancient Customs," contains no less than 50,000 words, which is about the number of provincialisms which it is estimated exist in the colloquial tongue of the lower classes of England, this estimate being founded upon actual collections made in thirty-five counties.—*Brother Jonathan.*

ORIGINES.

Paulus Jovius is the first who has introduced mottoes; Dorat the first who brought anagrams into fashion. Rabelais is the first who has written satires in French prose; Etienne Jodelle the first who introduced tragedies into France. The Cardinal of Ferrara, Archbishop of Lyons, is the first person who had a tragi-comedy performed on the stage by Italian comedians. The first sonnet which appeared in French, is attributed to Jodelle.—*Cyclopædia of Literary and Scientific Anecdotes.*

"ITS."

'His' is the genitive of 'he'(' he's,'—'his') and 'it' or 'hit,' as it was long written (Sir Thomas More in general so writes it, but about his time 'hit' is going out), is the neuter of 'he,' the final 't' being the sign of the neuter. The introduction of 'its' as the neuter geni-

tive instead of 'his' arose from a misconception, similar to that which would have arisen had the Romans introduced illud*ius* as the neuter genitive of 'ille' instead of 'illius.' 'Its' does not once occur in our authorized version of the Bible, his or her being used instead. 'Its' occurs, I believe, only three times in all Shakspeare, and I doubt whether Milton has once admitted it into *Paradise Lost*, although, when that was composed, others freely allowed it.—TRENCH's *English Past and Present.*

LACQUER.

The word *lacquer* is evidently derived from the Indian name *lac* or *lock*, which is the resin secreted together with lac-dye by the lac insect, a species of *coccus*. This substance is used for a variety of purposes in India, and is the common material for uniting things together, as gum and glue are in Europe. The term *lacquer* is applied to laying on or covering with a preparation of lac; but two different processes are usually confounded under this term. The one prevailing in Burmah and the southern parts of the Indian Peninsula was well known to Dampier, in 1688, as he says, "The lac of Tonquin is a sort of gummy juice which drains out of the bodies or limbs of trees." Some chemical change, no doubt, takes place on exposure of these juices to the air. This lacquer is prepared from the juice of a family of plants (the *Terebinthaceæ*) the same as that to which the mocking nut and sumach belong. The chief expense of the manufacture arises from the care with which successive layers of varnish must be laid on. Another kind of lacquer work is rather of the nature of papier-maché, covered with one or more layers of lac-varnish.—PROF. ROYLE's *Lecture before Society of Arts.*

PORTER.

This now familiar name, as applied to a species of malt liquor, is said to be first found in Nicholas Amherst's *Terræ Filius*, published May 22, 1721. It was in 1722 that Harwood, a London brewer, commenced brewing the liquor, which he called "entire" or "entire butt," implying that it was drawn from one cask or butt. It subsequently obtained the name of *porter* from its consumption by porters and laborers.

POLTROON.

A curious piece of history is wrapped up in the word "poltroon," supposing it to be indeed derived, as many excellent etymologists have

considered, from the Latin "pollice truncus," one that is deprived, or who has deprived himself, of his thumb. We know that in old times a self-mutilation of this description was not unfrequent on the part of some cowardly, shirking fellow, who wished to escape his share in the defence of his country; he would cut off his right thumb, and at once become incapable of drawing the bow, and thus useless for the wars. It was not to be wondered at that Englishmen should have looked with extremest disdain on one who had so basely exempted himself from service, nor that the "pollice truncus," the poltroon, first applied to a coward of this sort, should afterwards become a name of scorn affixed to every base and cowardly evader of the duties and dangers of life.—TRENCH's *Study of Words.*

CYNOSURE.

Cynosura (from the Greek words signifying the *tail of the dog*) is a name given to the lesser bear. According to Aratus and Hyginus, Cynosure was one of the nymphs of Mount Ida, who nursed Jupiter. But it is at least probable that, before the Greeks adapted their mythology to the constellations, they had, from some oriental source, the habit of figuring ursa minor as a dog, and that the tail of the dog was the pole-star. Many persons may probably know this word only from the two lines of Milton's *Allegro:*

"Where perhaps some beauty lies,
The cynosure of neighboring eyes."

These lines have puzzled many; though the reference to the pole star, and the property of the magnet, gives the image a degree of fitness for poetry which the etymology of the word alone would hardly suggest. —*Penny Cyclopædia.*

THE ASSASSINS.

From the fanatical crimes of this sect, the word Assassin has found a place in European languages. These assassins had in the twelfth century the possession of many hill-forts in Syria; and from their colony of Mount Libanus, went forth the secret ministers of the revenge or the avarice of their sheik; to whom his followers vowed a blind obedience, believing that his commands were those of a divinity, and that if they fell in the discharge of the duties assigned them, all the joys of paradise would be their reward. In every variety of disguise these missionaries of the dagger found their way to the courts of princes in the East and in the West; and Christian and Mussul-

man equally dreaded the danger against which no vigilance could guard.

There are few words the etymology of which has more baffled the ingenuity of the learned than Assassins. Perhaps the following may not be very remote from the truth. Throughout all the East, a preparation of hemp, which we call *bang*, is universally used "to exhilarate the feelings by a luxurious species of intoxication." This is known to the Orientals by the name of *Haschish;* and those who are addicted to it are called *Haschischin* and *Haschaschin*, "two expressions," says De Sacy, "which explain why the Ismaelians have been called by the historians of the Crusades, at one time *Assissini*, and at another *Assassini;* so that instead of a "secret murderer," "assassin" implies, in point of fact, "an habitual drunkard."—*Quarterly Review.*

PECUNIA—MONEY.

The Roman coin issued by Servius Tullius bore the image of a sheep (*pecus*), and was thence called *pecunia*, the term subsequently applied to money in general; but this is by no means certain.—*Niebuhr.*

The first silver money was coined at Rome, A. U. C., 482; the mint was in the Temple of Juno Moneta, and this circumstance occasioned the origin of our word "money."—*Hooke's Rome.*

MARQUETRIE

Is the production of an imitative object, by inlaying with wood veneers of different colors, natural or dyed; the picture being enriched by engraving, scorched with hot sand in parts that require shadow, and finally polished. The use of woods of different growth causes, in time, through their unequal contraction, &c., an imperfect surface and defective joinings, as is evident in nearly all old Marquetrie. To prevent this, white veneers of one wood have been used, and dyed each part to the required color.

ORIGIN OF THE GOD HYMEN.

Danchet, the French poet, in his *Dissertation sur Cérémonies Nuptiales*, tells us that Hymen was a young man of Athens, obscurely born, but extremely handsome. Falling in love with a lady of rank, he disguised himself in female attire, the better to carry on his amour; and, as he was one day on the sea-shore, celebrating the Eleusinian rites with his mistress and her female companion, a gang of pirates

came upon them by surprise, and carried them off to a distant island, where the pirates got drunk for joy, and fell asleep. Hymen then armed the virgins, and despatched the sleeping pirates; when, leaving the two women upon the island, he sped to Athens, told his adventure, and demanded his beloved in marriage as her ransom. His request was granted; and so fortunate was the marriage, that the name of Hymen was ever after invoked on all future nuptials; and in progress of time the Greeks enrolled him among their gods.—*Curiosities of History.*

HUMBUG.

There has been of late considerable discussion as to the origin of this word. It is said to occur first in Fielding's Amelia, 1751. One writer suggests that it is a corruption of the Latin *Ambages;* another that it is derived from a man named Hume, who, in olden time in Scotland, succeeded to the Bogue or Boog estate, and was known as "Hume o' the Bogue," or "Aum o' the Bug," who was so inclined to the marvellous, that when any one made an extraordinary statement, it soon became common to style it "a hum o' the bug," which was soon shortened into *hum-bug.* Another antiquary derives this word from a worthless coinage in use in Ireland under William III., which was called *him-bog*, pronounced *oom-bug*, i. e. soft copper, worthless money. Still another derives it from a Mr. Humbog, a celebrated Irish dancing-master.

CHOUSE.

Sometimes a word springs up in a very curious way; here is one, not having, I suppose, any great currency except among schoolboys; yet being no invention of theirs, but a genuine English word, though of somewhat late birth in the language, I mean to 'chouse.' The word is a Turkish one, and signifies 'interpreter.' Such an interpreter or 'chicous' being attached to the Turkish embassy in England, committed in the year 1609, an enormous fraud on the Turkish and Persian merchants resident in London. From the vast dimensions of the fraud, and the notoriety which attended it, any one who cheated or defrauded was said to "chicous," "chause" or "chouse," to do, that is, as this "chicous" had done.—Trench *on English Past and Present.*

TARIFF.

Nor is the true derivation of "tariff" unworthy to be traced. We all know what it means, namely, a fixed scale of duties, levied upon

imports. If you turn to a map of Spain, you will take note at its southern point, and running out into the Straits of Gibraltar, of a promontory, which from its position, is admirably adapted for commanding the entrance of the Mediterranean Sea, and watching the exit and entrance of all ships. A fortress stands upon this promontory, called now as it was also called in the times of the Moorish domination in Spain, "Tarifa:" the name, indeed, is of Moorish origin. It was the custom of the Moors to watch from this point, all merchant ships going into, or coming out of, the midland sea; and, issuing from this stronghold, to levy duties according to a fixed scale on all merchandise passing in and out of the Straits, and this was called from the place where it was levied, "tarifa," or "tariff;" and in this way, we have acquired the word.—TRENCH's *Study of Words.*

YANKEE.

The word Yankee is believed to have been derived from the manner in which the Indians endeavored to pronounce the word English, which they rendered Yenghees, whence the word Yankee. The statement in Irving's Knickerbocker's History of New York, concerning the tribe of Yankoos, is a mere joke. The word Yankee undoubtedly had been the Yenghees origin referred to above, but it does not seem to have been very common until the time of the Revolutionary War. I have not met with it in any writings previous to that time, and in letters in which the word occurs, written in 1775, it is referred to in a manner which shows that the writer considered it something new, and intended to be contemptuous, used as it was by their then enemies, the British soldiers. Noah Webster, in his dictionary, gives the Yenghees origin of the word, upon the authority of Heckewelder, and that fact may account for its being looked upon in New England as something novel. Heckewelder is excellent authority upon Indian subjects; but he spent his time principally among the Delawares and the Six Nations, and was not likely to be well acquainted with the Massachusetts Indians, who spoke a different dialect. Several of the regiments of British regulars who were transferred to Boston after the beginning of the troubles, had been stationed in the middle colonies, and had considerable experience in Indian warfare, and may have thus acquired a knowledge of the word. That the word was rather uncommon in New England, is shown by various letters written from thence. One from Rev. William Gordon, published in the "Penna Gazette," May 10, 1775, giving an account of the skirmishes at Concord and Lexington, says, "They (the British troops) were roughly handled by the

Yankees, a term of reproach for the New Englanders, when applied by the regulars." Another letter published in the same paper a few weeks afterwards, dated "Hartford, Connecticut," gives an account of the capture of several letters from English officers in Boston to their friends in England, and says, "Some of them are full of invectives against the poor Yankees, as they call us." From these facts it seems probable that the word was so unusual in New England that the writers thought themselves obliged to explain it. It was soon adopted, however. In a few months thereafter the citizens of Newbury fitted out a privateer called the Yankee Herd, and the name was used when speaking of the New Englanders, being spelt at times Yankie, Yanko, Yankoo, Yanku and Yankee. At this day, it is only applied in the United States to the inhabitants of New England, but foreigners use it to denote all the Americans.

In the Poetical Works of John Trumbull, published at Hartford, 1820, in two volumes, in the appendix appears the following note:

Yankies.—The first settlers of New England are mostly emigrants from London and its vicinity, and exclusively styled themselves the English. The Indians in attempting to utter the word, English, with their broad guttural accent, gave it a sound which would be nearly represented in this way, Yaunghees; the letter *g* being pronounced hard, and approaching to the sound of *k* joined with a strong aspirate, like the Hebrew *cheth*, or the Greek *chi*, and the *l* suppressed, as almost impossible to be distinctly heard in that combination. The Dutch settlers on the river Hudson and the adjacent country, during their long contest concerning the right of territory, adopted the name, and applied it in contempt to the inhabitants of New England. The British of the lower class have since extended it to all the people of the United States. This seems the most probable origin of the term. The pretended Indian tribe of Yankoos does not appear to have ever had an existence; as little can we believe in an etymological derivation of the word from ancient Scythia or Siberia, or that it was ever the name of a horde of savages in any part of the world.

In a curious book on the Round Towers of Ireland, the origin of the term Yankee-Doodle was traced to the Persian Phrase, "Yanki-dooniah," or "Inhabitants of the New World." Layard, in his book on Nineveh and its Remains, also mentions "Yanghi-dunia" as the Persian name of America.—*Notes and Queries.*

GROG.

Jack loves to give a pet nickname to his favorite officer. The gal-

lant Edward Vernon (a Westminster man by birth) was not exempted from the general rule. His gallantry and ardent devotion to his profession endeared him to the service. In bad weather he was in the habit of walking the deck in a rough grogram cloak, and thence had obtained the nickname of Old Grog. Whilst in command of the West India station, and at the height of his popularity on account of his reduction of Porto Bello with six men-of-war only, he introduced the use of rum and water by the ship's company. When served out, the new beverage proved most palatable, and speedily grew into such favor that it became as popular as the Admiral himself, and in honor of him was surnamed by acclamation "Grog."—*Notes and Queries.*

GASCONADES.

The inhabitants of the province of Gascony, in France, have long been celebrated for their lively sallies, called *Gasconades* (in French *Gasconnades*), the point of which consists in immoderate boasting of wit, wealth, or valor. The Dictionary of the French Academy, as an illustration, gives: He says he would fight ten men. Still, wit and piquancy should be intermixed with self-exaltation, as in the following: A Gascon, in proof of his nobility, asserted that in his father's castle they used no other firewood but the batons of the different marshals of France of his family.

ADAM'S APPLE

Is the name given to the protuberance in the fore part of the throat, occasioned by the projection of the thyroid cartilage of the larynx. This name originated from a superstitious tradition, that a piece of the forbidden fruit, which Adam ate, stuck in his throat, and occasioned the swelling.

ISINGLASS

Is corrupted from the Dutch *hyzenblas*, an air-bladder, compounded of *hyzen*, to hoist, and *blas*, a bladder; it being chiefly prepared from the sounds, swimms, or bladders, of sturgeon.

THE EARWIG.

This insect is doubtless named from its supposed fondness for getting into the human ear, the effect of which, it has been believed, is to penetrate the brain, and cause madness. Now, the earwig is not more likely than any other insect to enter the ear; and if it does so, the *membranum tympani*, the drumhead of the ear, will prevent the pro-

gress of the intruder, which may be killed or dislodged with ease by means of a few drops of oil. Now, as to the name of the earwig, its wings, when fully expanded, are in shape precisely like the human ear; from which circumstance, "it seems highly probable that the original name of this insect was ear-*wing*, and not ear-*wig*, which appears to be entirely without a meaning."—*Newman's Grammar of Entomology*, p. 65. The name is also traced to the Saxon *ear wigca*, from its destroying ears of grain and fruit.—*Thompson's Etymons of English Words.*

ZOUAVES.

The Zouaves are in theory natives of the French provinces of Algiers disciplined by French officers, and bearing exactly the same relation to the French army that the Sepoys in India have to the regular British troops. The Zouaves derive their name from the Gaouaoua or d'Ait-Gaoua, also called Zouaves, a Kabyle or primitive Berber population inhabiting the mountainous district between Bougie and Dellis, who are remarkable for their spirit of independence and warlike disposition. M. Carette in his work *Etudes sur la Kabyle proprement dite*, says that the confederation of the Zouaves comprises 201 villages and 94,000 souls. The organization of the Zouaves as a corps of the French army dates from the latter part of the year 1830. The force originally consisted of two battalions, but Frenchmen were almost from the first admitted into it. In 1832 the two battalions were formed into one, and in 1838 it was ordered, that of twelve companies composing a battalion only two were to consist of Frenchmen; though each company of natives could admit into its ranks a dozen French soldiers. At the end of 1835 the Zouaves were again divided into two battalions, each composed of four companies of 'indigènes,' and two of French. For various reasons, but especially in consequence of the intrigues of Abd-el-Kader, most of the natives have been long since induced to abandon the service, and few new recruits enter it; so that the corps of Zouaves is now composed almost exclusively of Frenchmen. The uniform has remained unchanged from the first, and consists of the same full pantaloons and *bornoos* which has now become so well known. The present Emperor has raised the number of regiments of Zouaves from one to three (of three battalions each), and they are now recruited by conscription like the other portions of the French army. Within a few years, since the hostility of the Arabs has in a measure been extinguished, and Abd-el-Kader has been withdrawn, a new body of native troops has been added to the French

army in Algiers. This constitutes the three battalions of the *Tirailleurs Indigènes* of the provinces of Oran, Constantine, and Algiers. The latter has increased so much, that in 1854 the Emperor divided it into two battalions forming the regiment of *Tirailleurs Algèriens*, who acquired renown in the East under the command of Colonel Coimpfeu.

ARGOSIE.

This term is applied by old writers to a ship of great burden, whether for merchandise or war:

> "Your mind is tossed on the ocean;
> There, where your argosies with portly sail,—
> Like signiors and rich burghers on the flood,
> Or, as it were, the pageants of the sea,—
> Do over-peer the petty traffickers."
> SHAKSPEARE's *Merchant of Venice, Act* 1. *Scene* 1.

It is mentioned in the same sense by Chapman, Drayton, Beaumont and Fletcher, and other writers. In Rycaut's Maxims of Turkish Policy, "those vast carracks called Ragosies," are said to be corruptly so denominated "from Ragosies, i. e. ships of Ragusa," on the Gulf of Venice; but it is more probable that the argosie derived its name from the classical ship Argo, as hinted by Shakspeare in the play just quoted, when he makes Gratiano, in allusion to Antonio's Argosie say:

> "We are the Jasons: we have won the fleece."

Sandys, in his Travels, applies the term to a ship of force in describing the boldness of the pirates in the Adriatic, observing, that from the timorousness of others they "gather such courage that a little frigot will often not fear to venture on an Argosie."

THE PALLADIUM.

Erichthonius, the pupil and favored companion of Athene (Minerva or Pallas), is said to have placed in the Acropolis the original Palladium, or wooden statue of that goddess, believed to have dropped from heaven. There was likewise a Palladium in Troy, which it was declared could not be taken whilst that statue remained within the walls. Hence the term has come to denote any effectual defence, protection, or safety. Thus, we say, trial by jury is the palladium of our civil rights.

THE AUGEAN STABLES.

Augeas, king of the Elians, is designated by Theocritus as the son

of the god Helios. He was rich in all sorts of rural wealth, and through the god's favor his cattle prospered and multiplied with astonishing success. His herds were so numerous, that the dung of the animals accumulated in the stable or cattle-enclosures beyond all power of endurance. Eurystheus, as an insult to Hercules, imposed upon him the obligation of cleansing this stable; the hero, disdaining to carry off the dung upon his shoulders, turned the course of the river Alpheios through the building, and swept the encumbrance away. Hence the phrase, to cleanse the Augean stable—to clear away any monstrous abuse.

THE ACADEMY DELLA CRUSCA.

Crusca is an Italian term, signifying *bran;* hence the Academy *della Crusca*, or the *Bran* Academy, which was established in 1582, at Florence, for purifying and perfecting the Tuscan language. Its device is a sieve, and its motto, *Il piu bel fior ne coglie;* that is, it gathers the finest flour thereof. In the hall where the academy meets every thing bears allusion to the name and device: the seats are in the form of a baker's basket, their backs being like a shovel for moving corn; the cushions, of gray satin, are in the form of sacks, or wallets; and the branches for lights resemble sacks.

THE BLUE-STOCKING.

This term applied to a lady of high literary taste, has been traced by Mr. Mills, in his *History of Chivalry*, to the Society de la Calza, formed at Venice in 1400, "when consistently with the singular custom of the Italians, of marking academies and other intellectual associations by some external signs of folly, the members, when they met in literary discussion, were distinguished by the colors of their stockings. The colors were sometimes fantastically blended, and at other times one color, particularly *blue*, prevailed." The Society de la Calza lasted till 1590, when the foppery of Italian literature took some other symbol. The rejected title then crossed the Alps, and found a congenial soil in Parisian society, and particularly branded female pedantry. It then diverted from France to England, and for a while marked the vanity of the small advances in literature in female coteries.

But the *Blue-stocking* of the last century is of home-growth; for Boswell, in his *Life of Johnson*, date 1781, thus records the origin of Blue-stocking;—

One of the most eminent members of these societies, when they first commenced, was Mr. Stillingfleet (grandson of the Bishop), whose dress was remarkably grave; and in particular it was observed that he wore blue stockings. Such was the excellence of his conversation, that his absence was felt so great a loss that it used to be said, "We can do nothing without the *blue stockings;*" and thus by degrees the title was established. Miss Hannah More has admirably described a *Blue-stocking Club*, in her *Bas Bleu*.

The earliest specimen on record of a Blue-stocking, or *Bas Bleu*, however, occurs in the Greek comedy entitled *The Banquet of Plutarch.*

ORIGIN OF "TRUE BLUE."

In England this partisan color was first assumed by the Covenanters in opposition to the scarlet badge of Charles I.; and hence it was taken by the troops of Lesley and Montrose in 1639. The adoption of the color was one of those religious pedantries in which the Covenanters affected a pharisaical observance of the Scriptural letter, and the usages of the Hebrews; and thus, as they named their children Habakkuk and Zerubbabel, and their chapels Zion and Ebenezer, they decorated their persons with blue ribbons, because the following precept was given in the law of Moses: "Speak to the children of Israel, and tell them to make to themselves fringes on the borders of their garments, putting in them *ribbons of blue*" (Numb. xv. 38).

The color was also a party distinction in Rome. In the factions of the Circus of the Lower Empire, the Emperor Anastasius secretly favored the *Greens*, Justinian openly protected the *Blues;* the latter, therefore, became the emblem of loyalty, the former of disaffection. For some less evident reason the Blues were looked upon as the party of the established and orthodox Church; and the convenient imputation of heresy thrown forth against the others served as a pretext for every act of rapine or oppression.

Edinburgh has a banner which was granted to the city by James III.: it is still esteemed a sort of palladium, and is called, from its color, *Blue Blanket.*

ORIGIN OF HURRAH.

The word is pure Slavonian, and is commonly heard from the coast of Dalmatia to Behring's Straits, when any of the population living within these limits are called on to give proof of courage and valor. The origin of the word belongs to the primitive idea that

every man that dies heroically for his country, goes straight to heaven —*Hu-ray* (to paradise), and in the shock and ardor of battle the combatants utter that cry, as the Turks do that of "Allah!" each animating himself by the certitude of immediate recompense to forget earth, and to contemn death.

THE PHILIPPICS.

This invective declamation is named from the orations of Demosthenes against Philip of Macedon, to rouse the Athenians against his crafty policy. They are the masterpieces of that great orator.

Cicero's orations against Marc Antony were also called Philippics from their being rivals of the invectives of Demosthenes. They cost Cicero his life; and Antony, having procured his murder, had his head and hands fixed on the rostra in the Forum, wherein the orator had delivered the Philippics.

MAUSOLEUM.

This word is derived from the superb tomb erected at Halicarnassus (now Budrum) to Mausolus, who died B. C. 353. The tomb was 118 feet by 93; around its base was a peristyle of 36 Doric columns, said to have been 60 feet high, while the superstructure rose in a pyramidal form to the height of 100 feet. Some of the large bas-reliefs with which it was ornamented have been preserved, and are now in the British Museum.

ORIGIN OF THE DIADEM.

The diadem originated in a ribbon, or fillet, woven of silk thread or wool. It was tied round the temples and forehead; the two ends being knotted behind and let fall on the neck. It was usually white and quite plain, though sometimes embroidered with gold and set with pearls and precious stones. According to Pliny, it was invented by Bacchus. Athenæus assures us that topers first made use of it to protect themselves from the fumes of wine, by tying it tightly round their heads; and that it long afterwards came to be a royal ornament.

WHO WERE THE BUCCANEERS?

An association of sea-robbers or pirates, called also "the Brethren of the Coast," who, for nearly two centuries, constantly waged war against the Spaniards in the West Indies; when the Caribbee Indians having taught the colonists to cure the flesh of cattle which they

called *boucan*, the French made therefrom *boucaner*, which the *Dictionnaire de Treveux* explains to be, "to dry red without salt;" hence comes the noun *boucanier* and our "buccaneer." The Buccaneers were Europeans, but chiefly natives of Great Britain and France, who first associated about 1524. Several narratives of their exploits have been written; that of Dampier, who was engaged in the Expedition of 1684, is strikingly interesting. Montauban, Grammont, Montbars, Vand-Horn, Laurent de Graff, and Sir H. Morgan, were also celebrated traders. Morgan, who found his way across the Isthmus of Darien from the Atlantic to the Pacific Ocean, and took and plundered the rich city of Panama, was knighted by Charles II.

FILIBUSTERS.

The title of Filibusters is a mere corruption of the English word freebooters—a German term imported into England during the Low-Country wars of Elizabeth's reign. It has been erroneously traced to the Dutch word *flyboat;* but the Jesuit traveller Charlevoix asserts that, in fact, this species of craft derived its title from being first used by the Flibustiers, and not from its swiftness. This, however, is evidently a mistake, as Drayton and Hakluyt use the word; and it seems to be of even earlier standing in the French language. The derivation from the English word freebooter is at once seen when the *s* in Flibustier becomes lost in pronunciation.—*C. W. Thornbury.*

THE NABOB

Is derived from *nawab*, the plural of *naib*, a deputy or lieutenant; but in the popular language of India, from which the word has come to us, the plural is used for the singular. Sir T. Herbert, whose Travels were published in 1634, spells the word *nabobb*, and defines it, "a nobleman in the language of the Mogul's kingdom, which hath mixed up with it much of the Persian." The word, applied to a wealthy man returning from India, seventy-five years back was very familiar.

CREOLE AND MULATTO.

Creole is a French form of the Spanish *criollo*, which, in the dictionary of Nuñez de Taboado is defined, "El hijo de padres Europeos nacido en America;" whilst in the old dictionary of Stevens (1726) it is translated, "son of a Spaniard and a West-India woman." The word is often, in England, understood to imply a Mulatto; but it strictly means a native of a West-India colony, whether white, black, or of

the colored population. Webster, however, defines it as "a native of Spanish America or the West Indies, descended from European parents;" and Mulatto, as "the offspring of a negress by a white man, or of a white woman by a negro."

SOLDIER AND VOLUNTEER.

The title of Soldier is derived from *solidus*, a piece of money. The Roman legions were *paid*. Hence the Volunteer, whose gallantry was gratuitous, was said to be "no soldier." A good *solidus* weighing sixty-seven grains, having on the obverse a bust with full face, and on the reverse a cross within a wreath, was sold by Sotheby and Co., in 1848, for 59*l.*

THE RUBRIC.

By this word is implied a rule or direction. It is derived from the latin word *rubrica*, which signifies red earth, red ochre, &c.; and it is employed to designate the rules which are laid down in the Book of Common Prayer to direct the minister and people in the performance of Divine worship. These rules were formerly printed in red letters, to distinguish them from the prayers and other parts of the liturgy, which were printed in black letters.

ORIGIN OF CANT.

This word, which is now generally applied to fanaticism and hypocritical conduct, is derived from two Scotch Presbyterian ministers in the reign of Charles II. They were father and son, both named Andrew Cant; and Whitelocke, in his *Memoirs*, after relating the defeat at Worcester, in 1651, says: "Divers Scotch ministers were permitted to meet at Edinburgh to keep a day of humiliation, as they pretended, for their too much correspondence with the king;" and in the same month, when Lord Argyll had called a parliament, Mr. Andrew Cant, a minister, said in his pulpit, that "God was bound to hold this parliament; for that all other parliaments were called by man, but this was brought about by his own hand."

FITZ.

It was a custom among the ancient Irish, when the father died, for his son to take the name, lest it should be forgotten: hence the names *Fitz*-herbert, *Fitz*-gerald, derive their origin, not as denoting the individuals to be of spurious birth, as some have imagined, but in

compliance with the custom observed before the use of surnames, when a person took his father's name, with the addition of his being his son; the prefix *Fitz* being a Norman word, derived from the French *fils*, a son.—*Camden Remains.*

WHAT IS A MARTINET?

This term is derived from the general officer, M. de Martinet, who was, as Voltaire states, celebrated for having restored and improved the discipline and tactics of the French army: whence very strict officers came to be called *martinets.*—*Notes and Queries*, No. 44.

CANADA.

Sir John Barrow derives this name as follows: When the Portuguese, under Gaspar Cortereal, in 1590, first ascended the great river St. Lawrence, they believed it was the strait of which they were in search, and through which a passage might be discovered into the Indian Sea. But on arriving at the point whence they could clearly ascertain it was not a strait but a river, they, with all the emphasis of disappointed hopes, exclaimed repeatedly, "Ca Nada!" (Here nothing),—words which were remembered and repeated by the natives on seeing Europeans arrive in 1534, who naturally conjectured that the word they heard employed so often must denote the name of the country. The more generally received derivation, which is supported by the analogy of other names, is, either that given by Charlevoix, from the Iroquois Kannata, a collection of huts; or from two Indian words, Kan or Can, a mouth, and Ada, a country, signifying the mouth of the country, and originally applied perhaps to the River St. Lawrence.—*Notes and Queries.*

THE JEWS'-HARP.

Jews'-harp is, probably, a corruption of Jaws'-harp, from its being placed between the jaws when played. It is also called Jews'-trump, a corruption of Jeu-trompe, a play-thing, or play-trump. A single Jew's-harp must necessarily be very incomplete; for, as Professor C. Wheatstone has shown, its sounds mainly depend on the reciprocation of columns of air in the mouth of the performer, and these sounds are perfectly identical with the multiples of the original vibrations of the instrument. By employing two or more instruments, however, the deficiencies are supplied; and a few years since, Mr. Eulenstein used, in London, sixteen instruments of different sizes, and was thus enabled

to modulate into every key, and to produce effects not only original but musical and agreeable.

ERYSIPELAS, WHY CALLED ST. ANTONY'S FIRE.

A note in the Life of St. Antony, in Alban Butler's Lives (Jan. 17th), explains the origin of the name: "In 1089 a pestilential erysipelas distemper, called the Sacred Fire, swept off great numbers in most provinces of France; public prayers and processions were ordered against the scourge. At length it pleased God to grant many miraculous cures of this dreadful distemper to those who implored his mercy through the intercession of St. Antony, especially before his relics; the church in which they were deposited was resorted to by great numbers of pilgrims, and his patronage was implored over the whole kingdom against this disease.—*Notes and Queries.*

SPINSTER.

For the first time in the annals of archæology, the early implements of spinning and weaving were met with in the graves of the Alemanni, at Oberflacht, in Suabia, discovered in 1846. Among these were found spindle-pins; but the distaff did not appear. Here were also the perforated rounds of stone, which were probably affixed to the ends of the spindles to cause them to revolve more rapidly by their weight, obedient to the twirl of the industrious housewife.

This manual operation, so indispensable in early times, furnished the jurisprudence of Germany and England with a term to distinguish the female line, *fusus;* and a memento of its former importance still remains in the appellation of *spinster*. Alfred, in his will, speaks of his male and female descendants by the terms of the spear-side and spindle-side; and the German jurisprudents still divide families into male and female by the titles of *schwertmagen*, sword-members, and *spill* or *spindlemagen*, spindle-members. Hence spears in graves are as significant as spindles and spindle-heads.

The term *spinster*, or single woman, in law, is now the common title by which an unmarried female is designated. "*Generosa*," says Lord Coke, "is a good addition for a gentlewoman; and if such be termed *spinster*, she may abate the writ." This, however, is not so now, for the word *spinster* is applied to all unmarried women of whatever rank or condition. It was formerly customary to call an unmarried lady of station *Mistress* instead of Miss, and this may have the same grounds as Lord Coke's observation.

FOOLSCAP PAPER.

It is said that this designation is derived from the fact that Charles I. granted to certain parties the monopoly of the manufacture of paper, which at that time always bore in water marks the royal arms. Parliament, under Cromwell, made jests of this in every conceivable manner, and ordered that the royal arms be removed from the paper, and the fool's cap and bells substituted. These were also removed when the Rump Parliament was prorogued, but paper of the size of the Parliament journals still bears the name of "foolscap."

FIDDLERS.—CATGUT.

Fiddler does not signify what we now understand by the word,—player on the violin. Thus in Fletcher's *Knight of the Burning Pestle*—

"They say it is death for these fiddlers to tune their rebecks."

And, in Shakspeare's *Taming of the Shrew*—

"call me fiddler!"

which is applied to a lutanist. The violin, according to Anthony Wood, seems not to have been known in England till the time of Charles I. It appears to have been borrowed from the old Welsh instrument called a *crwth;* which is not, however, tuned in the same manner as the violin. As for the rebeck, Mr. Percy, in the introduction to his collection of ancient ballads, informs us that it was a violin with only three strings. "It is remarkable, also, that the word *crwdyr* is supposed by Richards, in his Welsh Dictionary, to signify a vagabond. I conclude, however, it must also be used for the player on this instrument, who is, in Butler's *Hudibras*, styled *crowdero.*"

We suspect rather that the violin was introduced into England from France; for Charles II. kept a band of twenty-four violins, in imitation of the French king; and in this reign the violin first came into general use in England.

The idea that the viscera of the cat are employed for violin strings is altogether an error. In the old copy of Shakspeare's *Cymbeline* occurs, "horse-hairs and calves'-guts," which Rowe changed to cats'-guts; and he has since been followed. Upon which the editor of the *Pictorial Shakspere* notes; "We believe that there is not an example of it in any old author. In Bacon's *Natural History* we have a passage, in which *gut*, a musical string made of animal substance, is thus spoken of: 'A viol should have a lay of wire-strings below, close to the belly, and the strings of *guts* mounted upon a bridge.' Why not,

then, *calves'* guts as well as *cats'* guts? We know not how the name *catgut* arose; for *cats* have as little to do with the production of such strings as mice have." To this fancied association of the cat and strings of the violin, some imaginative persons have referred the sign of the *Cat and the Fiddle*, which so puzzled the *Spectator*. Another attributes it to a zealous Protestant innkeeper, who having survived the iron yoke of Mary, in the days of her successor, likened himself to the old Roman, and wrote over his door, "*l'Hostelle du Caton Fidelle*," afterwards corrupted to the Cat and Fiddle. A third etymologist traces it to the custom of a cat being shown about the streets, dancing to a fiddle; and he refers to an old book entitled *Twists and Turns about the Streets of London*, wherein is described "a poor half-naked boy, strumming on his violin, while another little urchin was, with the help of a whip, making two poor starved cats go through numerous feats of agility."

HOCUS POCUS.

Turner says that this was the name of an Anglo-Saxon magician; but others regard the two words as a corruption of the *hoc est corpus* used by priests in the mass.

HOTCHPOT.

Two illustrious luminaries of the law have derived the origin of hotchpot (*vulgo*, hodgepodge) as follows:

"It seemeth me that this word (Hotchpot) is in English a pudding; for in this pudding is not commonly put one thing alone, but one thing with other things together."—*Littleton*, sect. 267.

"Hutspot or Hotspot is an old Saxon word, and signifieth so much as Littleton here speaks."—*Coke upon Littleton*, 477 a.

ORIGIN OF THE PICNIC.

It is hard to say when this species of entertainment became fashionable; but we have an account of a very distinguished picnic that took place more than two centuries and a quarter ago, on the birthday of Charles Prince of Wales, afterwards Charles I. Mainwaring, in a letter to the luxurious earl of Arundel, dated November 22, 1618, says: "The prince his birthday has been solemnised here by the few marquises and lords which found themselves here; and (to supply the want of lords) knights and squires were admitted to a consultation, wherein it was resolved that such a number should meet at Gamiges, *and*

bring every man his dish of meat. It was left to their own choice what to bring; some chose to be substantial, some curious, some extravagant. Sir George Young's invention bore away the bell; and that was four huge brawny pigs, piping hot, bitted and harnessed with ropes of sarsiges, all tied to a monstrous bag-pudding."

THE BROAD-ARROW,

Used in England as a Government mark, is thought to have had a Celtic origin; and the so-called arrow may be the /|\ or Å, the broad *a* of the Druids. This letter was typical of superiority either in rank and authority, intellect or holiness; and is believed to have stood also for king or prince.—*Notes and Queries*, No. 108.

The same figure occurs on coins, gems, &c., as the symbol of Mithras; and the symbol of the Moon was used by the ancient Germans precisely as the broad-arrow, viz. on boundary-stones, &c. The like symbol occurs in the churches, as symbolical of the Sun of Righteousness, and in the painted windows and altar cloths, &c.

THE SIBYLLINE BOOKS.

The Sibylline Prophecies were originally of Teukrian or early Trojan descent; and the most celebrated of the Sibyls, or priestesses, plays an important part in the tale of Æneas; thence she passed to Cumæ in Italy. Her prophecies were supposed to be heard in dark caverns and apertures in rocks. They are thought by Varro to have been written in Greek hexameters upon palm-leaves, partly in verses, partly in hieroglyphs (*Niebuhr*). They were in full circulation in the reign of Crœsus; and the promises of future empire which they made to Æneas escaping from the flames of Troy into Italy, were remarkably realized by Rome. Lactantius derives its name Sibylla from the Æolic, *sios*, god, and *bule*, counsel. Of the nine books offered by a Sibyl for sale to Tarquinius Superbus, six were burnt; when Tarquinius purchased the remaining three for the price originally demanded for the nine. They were kept in a stone-chest underground in the temple of Jupiter Capitolinus, in the custody of certain officers, who only consulted the books at the special command of the senate; and this not to learn future events, but what worship was required by the gods when they had manifested their wrath by national calamities or prodigies. When the temple was burnt in B. C. 82, the Sibylline Books were also destroyed; but they were restored.

The Sibyl, from being believed to have foretold the Saviour's com-

ing, was not rejected by several Christians. This superstition continued later than is commonly supposed. Bede records some of her prophetic verses; and some Sibylline books appear to have been consulted till the tenth century.—Note in Lord MAHON's *Life of Belisarius.*

CIMMERIAN GLOOM.

The name Cimmerian appears in the Odyssey—the fable describes them as dwelling beyond the ocean stream, immersed in darkness, and unblest by the rays of Helios, or the sun. They belong partly to legend, partly to history; but they seem to have been the chief occupants of the Tauric Chersonesus (Crimea), and of the territory between that peninsula and the river Tyros (Dniester), at the time when the Greeks first commenced their permanent settlement on these coasts in the seventh century B. C.

HALCYON DAYS.

This figure for quiet and peaceful stillness came from the coast of Sicily; where the halcyon, or king's-fisher bird, is stated to breed in the sea, and there is said to be always a calm during her incubation, about fourteen days:

> "Amidst our arms as quiet you shall be
> As halcyon brooding on a winter's sea."—*Dryden.*

PASQUIN AND PASQUINADE.

Pasquin is the name given to a mutilated fragment of an ancient statue, found in Rome in the sixteenth century, and considered to represent Menelaus supporting the dead body of Patroclus. It was named Pasquin from Pasquino, a tailor, who lived hard by where the statue was found, "many years since," says Parisio, in his *Antiquities of Rome*, published in 1660. Pasquin's shop was the resort of the gossips of Rome; and he was a wag, and his witticisms were styled *pasquinate*, which hence became applied to epigrams and lampoons,—a kind of composition for which the modern Romans are noted. We subjoin a few specimens.

When Mezzofanti was made a cardinal, Pasquin declared that it was a very proper appointment; for there could be no doubt that the Tower of Babel, *il Torre di Babel*, required an interpreter. On the visit of the Emperor Francis to Rome, the following appeared: *Gaudium urbis, Fletus Provinciarum, Risus mundi.* On the election of Pope Leo X. in 1440, the following satirical acrostic appeared, to mark the

date MDCCCXL.: *Multi cæci cardinales creaverunt cæcum decimum* (*X.*) *Leonem.* During a bad harvest, in the time of Pius VI., when the loaf of two bajocchi had decreased considerably in size, the passion of the Pope for the inscription which records his munificence on two thirds of the statues in the Vatican, was satirized by the exhibition of one of these little rolls, with the inscription: *Munificentiâ Pii Sexti.* Pasquin's distich on the appointment of Holstenius and his two successors as librarians of the Vatican, is historically interesting. Holstenius had abjured Protestantism, and was succeeded in his office by Leo Allatius, a Chian, who was in turn succeeded by a Syrian, Evode Assemani, on which Pasquin said:

> Præfuit hereticus. Post hunc, schismaticus. At nunc
> Turca præest. Petri bibliotheca, vale!"

When Urban VIII. published his celebrated decree excommunicating all persons who took snuff in the churches of Seville, Pasquin quoted from Job: "Wilt thou break a leaf driven to and fro? and wilt thou pursue the dry stubble?"—*Handbook for Central Italy.*

UTOPIAN SCHEMES.

Sir Thomas More, in his curious philosophical work, *Utopia*, has delineated his ideas of a perfect commonwealth, which he places in the imaginary isle of Utopia, where the society is constructed on the principle that no one in the state shall have a right to separate property, since separate property is said to involve the unequal distribution of property, and thus occasion great suffering to those who are obliged to labor, and mental deprivation to those who live on the labors of others. In this imaginary island all are contented with the necessaries of life; all are employed in useful labor; no man desires in clothing any other quality besides durability. Since wants are few, and every individual engages in labor, there is no need for working more than six hours a day. Neither laziness nor avarice finds a place in this happy region; for why should the people be indolent when they have so little toil, or greedy when they know that there is abundance for each? It is, however, difficult to determine whether the opinions expressed in the *Utopia* are to be considered as More's real sentiments. But the work has added a word to the English language: schemes of national improvement founded on theoretical or visionary views being since then termed *Utopian.*

Sir Thomas More's *Utopia* is written in very good Latin, and was first published at Louvain, 1516. It has been translated into English by Robinson, by Bishop Burnet, and by A. Cayley.

THE SANDWICH.

The Sandwich is generally said to have been invented by a celebrated earl of Sandwich, which is an error. Suetonius, in the life of Tib. Claudius Cæsar, mentions it under the name of "offula:" *Rogo vos, quis potest sine offula vivere?*

ULTIMA THULE.

This is the name given in early history to the northernmost part of the habitable world; thence the Latin phrase, *Ultima Thule*, the utmost stretch or boundary.

Mr. Hogg, in a paper read to the Royal Society of Literature, in 1853, stated that it had been a common opinion that the *Ultima Thule* of the Romans was Iceland, but that he considered this rested upon no good authority. On the contrary, he believed that the Feroe Islands represent their *Ultima Thule*, it not being probable that, if the Romans had reached Iceland, they would have omitted discovering Greenland and America. Nothing certain is known of Iceland till the ninth century, though it has been imagined that the English and Irish were acquainted with its existence, as the Venerable Bede is said to have described the island pretty accurately. The Icelandic chronicles commence with the landing of the Norwegians, and state that a pirate of the name of Naddodr was driven by a storm upon Iceland in A. D. 861.

ATLAS SUPPORTING THE HEAVENS.

This fable most probably arose from Atlas, the celebrated king of Mauritania, being the inventor of the sphere, from his knowledge of astronomy, and from often observing the mysteries of the heavenly bodies on the top of that mountain. Or it may be a literal impersonation of Atlas being changed into the mountain of the same name, which runs across the desert of Africa from east to west, and is so high that the ancients thought the heavens rested on its summit. (Ovid, *Met.* iv. 656.) Again, Atlas is described as one of the sons of the rebellious Titan, Iapetus, for whose sin he was compelled to stand for ever at the extreme west, and to bear upon his shoulders the solid vault of heaven.

In the Museo Borbonico at Naples is a kneeling statue of Atlas sustaining the celestial globe, from the Farnese collection; a very interesting monument of Roman art, and one of great value to the student of ancient astronomy. Of the forty-seven constellations known to

the ancients, forty-two may be distinctly recognized. The date of this curious sculpture is fixed as anterior to the time of Hadrian by the absence of the likeness of Antinous, which was inserted in the constellation Aquila by the astronomers of that period.

THE GOLDEN FLEECE.

The professed object of the Argonautic Expedition was the pursuit of gold; and perhaps the accounts given by Strabo and Appian may be the most probable of any, which state it to be a practice of the Colchians to extend fleeces of wool across the beds of the torrents that fall from Mount Caucasus, and by means of these to entangle the particles of gold which were washed down by the stream. This mode of collecting gold, which is much the same with the one practised now on the coast of Guinea, and other rivers of Africa, made Colchis be regarded as the gold-coast of that early period.

THE BALLAD OF "THE BABES IN THE WOOD."

That the popular legend of "The Babes in the Wood,"—"one of the darling songs of the common people, and the delight of most English men in some part of their age" (*Addison*,)—was a disguised recital of the reported murder of his young nephews by Richard III. can scarcely be doubted, from the general resemblance of the ballad to Sir Thomas More's and Shakspeare's account of the dark deed. Throughout the tale there is a marked resemblance to several leading facts connected with Richard III., and his brother's children, as well as a singular coincidence between many expressions in the poetical legend and the historical details of the time. Among other evidence adduced in the Appendix to Halstead's *Life of Richard III.*, is that of a rude representation of a stag surmounting the black-letter copy of the ballad at Cambridge; a *hind*, or female stag, being the badge of the unfortunate Edward V. Again, the tale corresponds essentially with the chroniclers; and its moral altogether closely resembles the reflections with which Fabyan, Grafton, Hall, and Holinshed terminate their relation of the event.

WHO WERE THE FIRST SYCOPHANTS?

Sycophant (sycophanta)—a tale-bearer, a false-accuser, a deceiver, parasite, smell-feast. The name arose upon this occasion: "There was a law in Athens that none should transport figs out of the territory of Attica; such as gave information of those that, contrary to this

law, conveyed figs into other ports, were termed Sycophants, from Sycos, which is in Greek a fig.—*Blount's Glossography.*

CANARD, OR HOAX.

M. Queletel, in the Annuaire de l'Académie Française, attributes the first application of this term, as above to Norbet Cornelissen; who, to give a sly hit at the ridiculous pieces of intelligence in the public journals, stated that an interesting experiment had just been made calculated to prove the extraordinary voracity of ducks. Twenty were placed together; and one of them having been killed and cut up into the smallest possible pieces, feathers and all were thrown to the other nineteen and most gluttonously gobbled up. Another was then taken from the nineteen, and, being chopped small like its predecessor, was served up to the eighteen, and at once devoured like the other; and so on to the last, who thus was placed in the position of having eaten his nineteen companions. This story most pleasantly narrated, ran the round of all the journals of Europe. It then became almost forgotten for about a score of years, when it came back from America with amplifications, but the word remained in its novel signification.

THE MOUNTAIN.

Brissot was the originator of one expression still in constant use on the continent of Europe, the term Montagne, "Mountain," applied to the extreme radicals, "the left." He first used it one day in the Constitutional Assembly, contrasting them with the aristocrats, the Modérés. "Enfants de la Montagne," exclaimed he, "close up your ranks." This term "Mountain," as applied especially to the Jacobins, led Garnier to draw a rather peculiar parallel from Scripture. Speaking of his companions one day in the Club, he exclaimed: "The legislative body has a mountain. As Moses brought his laws down from a mountain, so shall 'the Mountain' of the Convention give laws to France." —*North American Review.*

RADICAL.

The application of the term *Radical* arose about the year 1818, when the popular leaders, Henry Hunt, Major Cartwright, and others, sought to obtain a Radical Reform in the representative system of Parliament; it never was applied to the Whigs as a party. Its origin may probably be traced to the writings of Lord Bolingbroke, who, in his Discourses on Parties, *Let.* 18, employs the term in its present ac-

cepted sense. He says: "Such a remedy might have wrought a *radical* cure of the evil that threatens our constitution," &c.—*Richardson's Dictionary.*

THE TERM "CONSERVATIVE."

This name, as distinguishing a party in politics, is of so recent an origin as January 1830. The word was occasionally used in its literal sense by the elder writers, particularly by Sir Thomas Browne; but had become obsolete, when it was revived in the following sentence in the *Quarterly Review*, vol. xliii. p. 276, in a paper attributed to Mr. Croker: "We despise and abominate the details of partisan warfare; but we now are, as we always have been, decidedly and conscientiously attached to what is called the Tory, and which might with more propriety be called the *Conservative*, party," &c.

WHIG AND TORY.

The derivation of these terms, as applied to the two extreme parties in politics, is a much vexed question, which will probably never be satisfactorily settled. That stanch tory, Roger North, in his Examen, has referred the origin of the name of his party to their connection with the duke of York and his popish allies. Burton in vol. II. of his parliamentary diary, on the state of Ireland, under date of June 10, 1657, has the following passage:—Tory is said to be the Irish word *Toree*, that is, give me, which was the summons of surrender used by the banditti, to whom the name was originally applied. In support of this assertion, it may be as well to state that Tory or Terry Island, on the coast of Donegal, is said to have taken its name from the robbers by whom it was formerly infested. Dr. Johnson also supports Burton's derivation of the word; he calls it a cant term, signifying a savage. Mr. G. O. Borrow (alias Lavengro), who has devoted much attention to the Celtic dialect in a paper which he contributed some years back to the *Norfolk Chronicle*, suggested that the etymology of the word tory might be traced to the Irish adherents of Charles II. during the Cromwellian era; the words Tar-a-Ri (pronounced tory, and meaning, Come, O King), having been so constantly in the mouths of the Royalists as to have become a by-word to designate them. Lingard says that the name tory is derived from toringhim, to pursue for the sake of plunder. The name was given to certain parties of Ireland, who, refusing to submit to Cromwell, retired into bogs and fastnesses, forming bodies of armed men, supporting themselves and their followers by the depredations which they committed on the occupiers of their estates. They were called Raperees and Tories.

Concerning the word whig, Burnet says:—The south-west counties of Scotland have seldom corn enough to serve them round the year; and the northern parts producing more than they need, those in the west come in the summer to buy at Leith the stores that come from the north; and from a word, Whiggam, used in driving their horses, all that drove were called Whiggamores, and shorter, the Whigs. Now, in that year (i. e. 1648), after the news came down of Duke Hamilton's defeat, the ministers animated their people to rise and march to Edinburgh; and they came up marching on the head of their parishes with an unheard-of fury, praying and preaching all the way as they came. The Marquis of Argyle and his party came and bearded them, they being about 6,000. This was called the Whiggamore's inroad, and ever after that, all that opposed the court, came in contempt to be called Whigs; and from Scotland the word was brought into England, where it is now one of our unhappy terms of disunion.— BURNET'S *History of his own Times*, vol 1. p. 48.

Such is Burnet's account of the derivation of this word, in which he is followed by Samuel Johnson, who has transcribed the above passage in his Dictionary. Kirkton, also, in his History of the Church of Scotland, edited by C. K. Sharpe, in 1817, adheres to the same opinion. Under the year 1667, he says:—That the term Whig was originally derived from Scotland, is a well-ascertained fact; but while some of our etymologists follow the opinion of Burnet, others with greater show of reason, adhere to the opinion of Roger North, and the historians Laing and Lingard, all of whom were of opinion that the original Scotch Whigs were called so, not, as Burnet supposes, from the word used by them in driving their horses, but from the word whig being vernacular in Scotland for sour whey, which was a common drink of the people.

It is also suggested that the name "Whig" is derived from the Celtic ugham, a sort of large saddle, with bags attached to it, in use among the freebooters of the borders of Scotland: hence these robbers were known to the Highlanders by the name of Whiggam-more, or "big-saddle thieves;" and when the civil war broke out, the Highlanders and Irish, who supported the king, gave the name of Whiggamore thieves to their opponents.

To add one more derivation, an anonymous scrap says: The word Whig was given to the Liberal party in England by the royalists in Cromwell's days, from the initials of their motto, 'We hope in God.'"

But whenever these terms were first introduced, and whatever might be their original meaning, it is certain that in the reign of Charles

II. they carried the political signification which they have retained to our time. Thus, in Dryden's *Epilogue to the Duke of Guise*, 1682:

> "Damned neuters, in their middle way of steering,
> Are neither fish nor flesh, nor good red herring;
> Not Whigs nor Tories they; nor this nor that;
> Nor birds nor beasts; but just a kind of bat,—
> A twilight animal true to neither cause,
> With Tory wings, but Whiggish teeth and claws."

It has been said, and with a good deal of truth, that in this country these two words have interchanged their meanings. Certainly while the word whig in England denotes the liberals, here it was applied to the more conservative of the two parties that for so many years divided the people of this country. The application of the designations "ultra" and "moderate" to political parties is said to be first found in Rapin's Dissertation published 1717.

UNCLE SAM.

Immediately after the last declaration of war with England, Elbert Anderson of New York, then a contractor, visited Troy, where he purchased a large quantity of provisions. The inspectors of these articles at that place were Ebenezer and Samuel Wilson. The latter gentleman (universally known as "Uncle Sam") generally superintended in person a large number of workmen, who, on this occasion, were employed in overhauling the provisions purchased by the contractor. The casks were marked "E. A.—U. S." This work fell to the lot of a facetious fellow, who, on being asked the meaning of the mark, said he did not know unless it meant *Elbert Anderson* and *Uncle Sam*, alluding exclusively then to the said *Uncle Sam Wilson*. The joke took and became very current.—FROST's *Naval History*.

GERRYMANDER.

This term came into use in 1811 in Massachusetts, where for several years previous, the Federal and Democratic parties stood nearly equal. In that year the Democratic party, having a majority in the Legislature, determined so to district the State anew, that those sections which gave a large number of Federal votes might be brought into one district. The result was, that the Democratic party carried every thing before them at the following election, although it appeared by the votes returned that nearly two-thirds of the voters were Federalists. Elbridge Gerry was the instigator of this plan, which was therefore called, Gerrymandering.—*Dictionary of Americanisms*.

PIPE-LAYING.

This term originated from an accusation brought against prominent members of the Whig party of New York, of being engaged in a gigantic scheme to bring voters thither from Philadelphia, who, it was said, to better conceal the plan were designated as pipe-layers, the work of laying down pipe for the Croton water being at that time in progress. —*Dictionary of Americanisms.*

LOG ROLLING.

Log-rolling comes from the practice of the men of three or four different camps of lumbermen in Maine, uniting to help each other roll their logs to the river, this being the most difficult part of their work.—*Dictionary of Americanisms.*

LOCO-FOCO

This name, as a party designation, originated in 1835, when a division arose in the Democratic party in consequence of the nomination of Gideon Lee as a candidate for Congress, by a committee chosen for that purpose. This nomination, as was customary, had to be confirmed at a general meeting of Democrats at Tammany Hall. His friends anticipated opposition, and assembled in large numbers to support him. The first question arose on the selection of a chairman, and, during a very tumultuous scene, the gas lights were put out. The Equal Rights party, who were the opponents of Lee, had however, in anticipation of this, provided themselves with *loco-foco* matches and candles, and the room was at once relighted. The Courier and Enquirer newspaper, dubbed those who used the matches with the name of Loco-focos. The name was seized upon, and was soon given to the entire Democratic party.—HAMMOND's *Political History of New York.*

CABAL.

This word is by many considered as derived from the names of the unpopular ministry of Charles the Second, which consisted of Clifford, Ashley, Buckingham, Arlington, and Lauderdale, the initials of whose names compose the word. It is certain that the word was on this account applied to this ministry; but the close resemblance, both in orthography and meaning, which it bears to the French *Cabale* and the Italian and Spanish *cabala*, would seem to show that the word must have had a different origin.

MRS. PARTINGTON AND HER MOP.

This "labor in vain" will be found in the Rev. Sydney Smith's speech at Taunton, on the Lords' rejection of the Reform Bill, October 1831, in the following passage:

"The attempt of the Lords to stop the progress of reform reminds me very forcibly of the great storm off Sidmouth, and of the conduct of the excellent Mrs. Partington on that occasion. In the winter of 1824, there set in a great flood upon that town; the tide rose to an incredible height, the waves rushed in upon the houses, and every thing was threatened with destruction. In the midst of this sublime and terrible storm, Dame Partington, who lived upon the beach, was seen at the door of her house with mop and pattens, trundling her mop, squeezing out the sea-water, and vigorously pushing away the Atlantic Ocean. The Atlantic was roused; Mrs. Partington's spirit was up; but I need not tell you that the contest was unequal. The Atlantic beat Mrs. Partington. She was excellent at a slop or a puddle; but she should not have meddled with a tempest."

HEAR, HEAR.

This phrase, now so common in the British parliament, was originally "hear him," and "was first used in parliament to remind members of the duty of attending to the discussion: but gradually became what it now is, that is to say, a cry indicative of admiration, acquiescence, indignation, or decision," according to the tone, and no one can have heard it in its varied uses, without being struck with the great power of expression that simple intonation gives to this little word.

CAUCUS.

This word is said to occur first in Gordon's History of the American Revolution, Vol. 1, p. 240, published in 1788. He says that more than fifty years previous to the time of his writing, "Samuel Adams' father and twenty others in Boston, one or two from the north end of the town, where all ship business is carried on, used to meet, make a caucus, &c." From the fact that the meetings were held in a part of Boston where all the ship business was carried on, Mr. Pinckney in his Vocabulary (Boston, 1816) infers that *caucus* may be a corruption of *caulkers*, the word *meeting* being understood. This derivation has since been adopted by others.

LOUIS CAPET.

The name of Louis Capet, by which the Jacobins insisted upon

calling Louis XVI., is familiar to every one. Dandré first made use of it near the close of the Constitutional Assembly, when speaking of the abolition of the names of Artois, Condé and others. Antonelle then brought the matter up in the Jacobin club. "They attempt to show us," said he, "that Louis XVI. has no more right to be called Bourbon than Capet; but, as he must be designated in some manner or other, let us call him Capet." This was adopted amid great laughter, and the name was always afterwards used in speaking of its unfortunate object.—Dr. Zinkeisen's *History of the Jacobin Club.*

A GENERATION.

A generation is the interval of time that elapses between the birth of a father and the birth of his son, and was generally used in computing considerable periods of time, both in sacred and profane history. The interval of a generation is consequently of uncertain length, and depends on the standard of human life, and whether the generations are reckoned by eldest, middle, or youngest sons. Thirty-three years have usually been allowed as the mean length of generation, or three generations for every hundred years. In compiling pedigrees, great attention is necessary to the number of generations in any given period, as they form a guide to the probability of persons having sprung from any particular individual.

PARSONS.

As to the origin of this word, Selden says, in his "Table Talk"—"Though we write parson differently, yet 'tis but person, *i. e.* the individual person set apart for the service of such a church; and 'tis in Latin *persona*—and *personatus* is a personage."

In England, parsons were commonly called "Sir." Many instances of this might be given. Sir John Hawkins says that anciently Sir "was the common designation both of one in holy orders, and of a knight." Fuller, in his *Church History*, says, that "anciently there were in England more sirs than knights;" and so lately as the time of William and Mary, in a deposition in the Exchequer, in a case of tithes, the witness, speaking of the common curate, whom he remembered, styles him "Sir Giles."

WHAT IS A BILLION?

Or, rather, what conception can we form of such a quantity? We may say that a billion is a million of millions, and can easily represent it

thus: 1,000,000,000,000. But a school-boy's calculation will show how entirely the mind is incapable of conceiving such numbers. If a person were able to count at the rate of 200 in a minute, and to work without intermission twelve hours in the day, he would take to count a billion 6,944,444 days, or 19,325 years 319 days. There are living creatures so minute that a hundred millions of them might be comprehended in the space of a cubic inch. They are supplied with organs and tissues, nourished by circulating fluids, which must consist of parts or atoms, in reckoning the size of which we must speak, not of billions, but perchance of billions of billions. And what is a billion of billions? The number is a quadrillion, and can be easily represented thus: 1,000,000,000,000,000,000,000,000; and the same school-boy's calculation may be employed to show that to count a quadrillion at the rate of 200 in the minute would require all the inhabitants of the globe, supposing them to be a thousand millions, to count incessantly for 19,025,875 years, or more than 3000 times the period during which the human race has been supposed to be in existence.—PROFESSOR LAW, in *Jameson's Journal*, No. 106.

A LUSTRUM.

A lustrum, a period of time used by the Romans, is a period of five years; or more properly, the completion of fifty months, at the end of which term a census was taken of the population.

DERIVATION OF THE WORD "CASH."

There can be but little doubt that the word *cash* is derived from the Italian *cassa*, the chest in which Italian merchants kept their money, as do at the present time the Spaniards in their *caja*, and the Portuguese in their *caxa*, and the French in their *caisse*. The application of the word "cash" to money is altogether English, it not having a corresponding term in any other European language. Cash having been so inconsiderately adopted instead of *cassa*, (chest,) entries in the cash-book, (it should be chest book,) are made in English counting-houses in this unmeaning way: "Cash Dr.," and "Cash Cr.;" whereas the chest, and not the money, is Dr. to what is put into it; and Cr. for what is taken out. Great mischief has too often arisen, as is well known, in Bankrupt Courts, from the misuse of the word "cash," in which large deficiencies often appear, and which would not be the case if the word chest were used as it ought to be. Instead of the "cash" account in the ledger, it should be the "chest" account.

COFFEE

Is derived from the Arabic *kahwah*,—Turkish *kahve*, says Mr. Craufurd, in the *Proceedings of the British Association.* The English word evidently comes direct from the Turkish. The coffee-plant is a native of Abyssinia, and not of Arabia; for it was not known at Mecca until 1454, only forty years before the discovery of America. The true name of the plant is *bun*,—and *kahwah*, or coffee, means "wine," as a substitute for which the decoction was used; although the legality of the practice was long a subject of dispute by the Mohammedan doctors. From Arabia it spread to Egypt and Turkey, and from the last-named country was brought to England in 1650. In sixty years' time it was familiarly known, at least in fashionable society, as we find from Pope's well-known lines in the *Rape of the Lock*—

> "Coffee, which makes the politician wise,
> And see through all things with his half-shut eyes."

THE TEA-CADDY.

This is a corruption of the Malay name of a Chinese weight, being the hundredth part of a *pikul* or man's load, and reckoned at a pound and a third avoirdupois. The name of this weight is *kati*, usually written by Europeans *cattie* or *catty*.

GUANO.

The original name of guano is *huanu*, which is a term in the Quichua dialect, meaning "animal dung;" for example *Huanacuhuanu*, excrement of the Huanacu. As the word is now generally used, it is an abbreviation of *Pishu Huanu*, bird-dung. The Spaniards have converted the final syllable *nu* into *no*, as they do in all the words adopted from the Quichua which have the like termination. The European orthography, *Guano*, which is also followed in Spanish America, is quite erroneous; for the Quichua language wants the letter G, as it does several other consonants. The H at the commencement of the word is strongly aspirated, whence the error in the orthography of the Spaniards.—Von Tschudi's *Travels in Peru.*

THE "NAVVY."

This term has become almost naturalized, and now is understood to mean a laborer employed in the construction of a railway. It is a corruption of the word "navigator;" but what has a navigator to do with railways? Before the age of railways, "navigable canals" were

the order of the day: and the laborer employed in their construction, was, with some propriety, called a navigator. When railways superseded canals, the laborer very improperly was continued to be called a navigator, or, as now corrupted, a "navvy;" whereas the word "excavator" would have been better.

ERA AND EPOCH.

Much confusion frequently occurs in the use of these terms among chronologists: the accurate use is as follows:—

Era is any indefinite time; *period* is a time included between two dates. The beginning and end of the period are *epochs*, though in common parlance, *epoch* is generally confined to events of some distinction.

TODDY.

This term for a mixture of spirits and water, appears to be taken from the Indian word *tari* or *tadi*, pronounced *toddy* by Europeans,—the sap or wine of a palm.—Craufurd.

COCKNEY.

The Etymologists have referred the term Cockney to Cockenay, from the Latin *coquinator* or *coquinarius*, a cook, but perhaps not upon sufficient grounds.

Fuller, in his *Worthies*, gives the two following explanations of the term:—"1. One coaks'd or cocker'd, made a wanton or nestlecock of, delicately bred and brought up, so that, when grown men or women, they can endure no hardship, nor comport with painstaking. 2. One utterly ignorant of husbandry and housewifery, such as is practised in the country, so that they may be persuaded anything about rural commodities; and the original thereof, and the tale of the citizen's son, who knew not the language of the cock, but called it neighing, is commonly known."

"The tale of the cock neighing is gravely given by Minshieu in his *Guide into the Tongues;* and is repeated in succeeding dictionaries. Whatever be the origin, there can be no doubt that London was anciently known by the name of Cockney. Tyrwhitt, in his *Notes on Chaucer*, ingeniously suggests that authors, "in calling London Cockeney, might possibly allude to that imaginary country of idleness and luxury, which was anciently known by the name of Cokaigne, or Cocagne; a name which Hicks has shown to be derived from Coquina.

Boileau, in his *Satires*, speaks as if the same appellation had been bestowed upon the French as upon the English metropolis, thus,—

"Paris est pour un riche un pays de Cocagne."*

"The festival of Cocagna at Naples, described by Keyslor, appears to have the same foundation."

According to Fynes Moryson, the Londoners, and all within the sound of Bow-bell, are in reproach called Cockneys, and eaters of buttered toasts.

HOB-NOB.

This phrase, now only used convivially, to ask a person whether he will have a glass of drink or not, is most evidently a corruption of the old *hab-nab*, from the Saxon *habban*, to have, and *nabban* not to have; in proof of which Shakspeare has used it to mark an alternative of another kind:

"And his incensement at this moment is so implacable, that satisfaction can be none but by pangs of death and sepulchre; *hob-nob* is his word; give't or take't."—*Twelfth Night*, act iii. sc. 4.

RECENT ORIGIN OF "STARVATION."

Starvation is a word of quite recent introduction, and is an Americanism. Strange as it may appear, it is nevertheless true, that this word is not to be found in *our own* English dictionaries; neither in Todd's Johnson, published in 1826, nor in Richardson's published ten years later, nor in Smart's *Walker Remodelled*, published about the same time as Richardson's. It is Webster who has the credit of importing it from his country into this, and in a supplement issued a few years ago, Mr. Smart adopted it as a *trivial* word, but in very common, and at present, good use.—*Notes and Queries*.

TRANSPIRE.

Few words of modern introduction have had greater success than "Transpire,"—for it is not only in general, but even in vulgar use. Johnson's awkard substitute of "get-abroad," does not seem to express exactly the same meaning; a secret may *get abroad* by design, by accident, by breach of confidence; but it is said to *transpire* when it becomes known by small indirect circumstances—by symptoms—by in-

* The "*Mât de Cocagne*," the Mast of Cocagne, is, to this day, one of the favorite sports of the Champs Elysées, in Paris; and is known in English as the greased pole.

ferences. It is now often used in the direct sense of "*get abroad*," but, as appears to me, incorrectly.—CROKER.

THE TERM RILIEVO.

This term, improperly spelt *Relievo*, as applied to sculpture, signifies the representation of any object projecting or standing forth from the plane on, and commonly out of which, it is formed. Of rilieves there are three kinds *basso*, *messo*, and *alto:* the first is, when the projection is less than one-half of the natural thickness, such as is seen on coins or medals; the second, when one-half of the figure emerges; the third, when the figure is so completely salient, that it adheres to the plane only by the narrow strip.

I. H. S.

St. Bernardine of Sienna is said to have been the inventor of these initials, to denote the name and mission of our Saviour. They are to be found in a circle above the principal doors of Santo Croce in Florence, and are said to have been placed there by the Saint after the plague of 1347, after which time, these letters were very soon commonly introduced into churches. These letters have had assigned to them, the following significations:—*Jesus hominum Salvator;* Jesus the Saviour of men;" or, *In hoc salus*, "In him is salvation."

INRI.

This word stands for Jesus Nazarenus, Rex Judæorum, the inscription over the cross.

OLD DOMINION.

It is stated that the term "Old Dominion," as applied to Virginia, originated from the following facts: During the protectorate of Cromwell, the colony of Virginia refused to acknowledge his authority, and sent to Flanders for Charles II. to reign over them. Charles accepted, and was about to embark when he was recalled to the throne of England. Upon his accession, as a reward for her loyalty, he allowed the Colony to quarter the arms of England, Ireland, and Scotland as an independent member of the "Old Dominion." The historical facts upon which this statement is based seem well-founded.

HARD-DRINKING.

That hard-drinking was introduced from Flanders and Holland,

and other northern countries, seems probable from the derivation of many of the expressions used in carousing. The phrase of being "half-seas-over," as applied to a state of drunkenness, originated from *op see*, which, in Dutch, means *over sea;* and Gifford informs us that it was a name given to a stupefying beer introduced into England from the Low Countries, and called *op see*. An inebriating draught was also called an *up see freese*, from the strong Friesland beer. The word "carouse," according to Gifford and Blount, is derived from the name of a large glass, called by the Danes *rouse*, or from the German words, *gar*, all, and *aus*,—hence drink *all out*.

THE ROUND-ROBIN.

This is a circle, divided from the centre, like the famed Arthur's Round Table, whence it is thought to have originated. In each compartment of the "Robin" is a signature; so that the entire circle, when filled, exhibits a list, without priority being given to either name.

It is, however, stated that the Round-Robin, without which a sailor would think himself deprived of his right of petition, was first invented in Athens, on the occasion of the conspiracy of Aristogeiton and Harmodius against the tyranny of the Pisistratidæ. The Romans, in imitation of the Greeks, not to indicate their preference to any either among their guests, or friends, or slaves, wrote their names in a circle, in such a manner that it was impossible to say which was first, second, or last in their estimation.

OLD FOGIES.

This word is said to be derived from a peculiar body of men, who, at the end of the last century, existed in Edinburgh Castle, and were called *Fogies*. They were old men, dressed in red coats with apple-green facings and cocked hats, and were a sort of invalid company, who performed various trivial duties. Others derive this word from the Swedish, meaning a bailiff. Others still derive it from *folk*, as *lassie* is derived from *lass*.

BROTHER JONATHAN.

The origin of this term, as applied to the United States, is as follows: When General Washington, after being appointed commander of the army of the revolutionary war, went to Massachusetts to organize it, he found a great want of ammunition and other means for its defence; and on one occasion it seemed that no means could be devised for the necessary safety. Jonathan Trumbull, the elder, was then governor of

the State of Connecticut; and the general, placing the greatest reliance on his excellency's judgment, remarked, "We must consult Brother Jonathan on the subject." The general did so; and the governor was successful in supplying many of the wants of the army: and thenceforth, when difficulties arose, and the army was spread over the country, it became a by-phrase, "We must consult Brother Jonathan;" and the name has now become a designation for the whole country, as John Bull has for England.—*Dictionary of Americanisms.*

PUNCH AND JUDY.

The supposed origin of these puppets from Pontius Pilate and the Jews has no authority from history. Much learning has been bestowed on this subject by Galiani in his *Vocabulary* of the Neapolitan dialect, and he fixes upon Puccio d'Aniello at Acerra, near Naples, as the original Punch, after whose death a Polecenella or young Puccio succeeded him.—*Notes and Queries.*

ORIGIN OF THE NAME JESUIT.

When the little band of the first followers of Don Ignatius de Loyola, the founder of "the Great Order," were deliberating what answer they should return to those who were continually questioning them as to their calling and their institute, Ignatius (says Orlandinus), afraid that, in imitation of the Dominicans, the Benedictines, the Franciscans, and many other religious societies thus attacked, his devoted companions would adopt their founder's name as their designation, begged them to leave in his hands the decision of the point. They complied, unaware, perhaps, of the humility which dictated the request; and Ignatius, ever full of military ideas, said: "As our general is no other than Jesus Christ; as His cross is our standard; His law, even in its counsels, our rule; His name our chief consolation and our only hope,—let us tell men the simple truth—that we are the little battalion of Jesus Christ." Such is the origin of the title "Society of Jesus," which has been vulgarized into the shorter and more *portable* name of Jesuits.

Few men are aware what a proportion of the illustrious characters of the last three hundred years have been the pupils of the Jesuits. Buffon, Bossuet, Condé, Massillon, represent distinct classes of great men, and stand almost at the head of those classes. They were pupils of the Jesuits. Voltaire was a pupil of the Jesuits. His irreligion he certainly did *not* get among them, and his talents came from God; but

the most remarkable feature of his literary character bears the impress of the Jesuit education, which that too celebrated man enjoyed and abused, and turned at once against the Jesuits and against his Maker. —MILES GERALD KEON, in the *Oxford and Cambridge Review*.

HUGONOT OR HUGUENOT.

Some etymologists suppose this term derived from *huguon*, a word used in Touraine to signify persons who walk at night; and as the first Protestants, like the first Christians, may have chosen that season for their religious assemblies, the nickname of Huguenot may naturally enough have been applied to them by their enemies. Others are of opinion that it was derived from a French and faulty pronunciation of the German word *Eidgenossen*, which signifies confederates, and had been originally the name of that valiant part of the city of Geneva which entered into an alliance with the Swiss cantons, in order to maintain their liberties against the tyrannical attempts of Charles III., Duke of Savoy. These confederates were called *Egnotes;* and thence, very probably, was derived the word Huguenot, now under consideration. The Count Villars, in a letter written to the King of France from the province of Languedoc, where he was lieutenant-general, and dated 11th November, 1560, calls the riotous Calvinists of the Cevennes, Huguenots; and this is the first time that the term is found in the registers of that province applied to the Protestants.—MOSHEIM's *Ecclesiastical History*, vol. iv. p. 368 in notis.

Davila, in his *Hist. des Guerres Civiles de la France*, p. 20, folio ed., says: "These people were called Huguenots, because the first conventicles they held in the city of Tours (where that belief first took strength and increased) were in certain cellars underground, near Hugo's gate, from whence they were by the vulgar called Hugonots; and in Flanders because they went about in the garb of mendicants, they were called Geux."

THE GORDIAN KNOT

Is named from this incident in classic history: Gordius, (a king of Phrygia Major), being raised from the plough to the throne, placed the harness, or furniture of his wain and oxen in the temple of Apollo, tied in such a knot that the monarchy of the world was promised to him that could untie it; which, when Alexander, that "tumour of a man," had long tried, and could not do, he cut it with his sword.

BOYARD.

The title Boyard, now used only in the Danubian principalities to designate the aristocracy, meant originally "ox-driver," referring to the military cars which bore the warriors in battle, of which oxen were the steeds. In the fifteenth century this term became the badge of nobility.—*North American Review.*

O RARE BEN JONSON.

The origin of this familiar exclamation is not generally known. Soon after his death and burial in Westminster Abbey in 1637, a subscription was begun to erect a monument to him, but it rather lagged, and an eccentric Oxfordshire squire, commonly called Jock Young, took the opportunity, as he was passing through the Abbey, to secure at least an epitaph for the poet, by giving a mason eighteen-pence to cut on the stone which covered the grave, the words "O rare Ben Jonson!"—*North British Review, Feb.* 1856.

ALL THE GO.

It is suggested in Notes and Queries that the slang phrase "All the Go" is derived from an expression of the French peasants. A passage from Don Quixote, *J'entrerai tout de go dans la taverne*, is cited.

SEEING THE LIONS.

This expression arose from the habit that strangers visiting London formerly had of visiting the menagerie in the Tower where lions were kept. At the time the expression arose, these lions constituted one of the great "sights" of London.

REVENONS À NOS MOUTONS,

Is a proverb taken from the old French play of *Patelin*, where a woollen-draper is brought in, who, pleading against his shepherd concerning some sheep the shepherd had stolen from him, would ever and anon digress from the point to speak of a piece of cloth which his antagonist's attorney had likewise robbed him of, which made the judge call out to the draper, "*Revenons à nos moutons.*" This proverb may also be traced to that of *alia Menecles, alia Porcellus loquitur;* and see Erasmus's explanation thereof.—*Notes to Rabelais' Works*, vol. i., 1807.

NE SUTOR ULTRA CREPIDAM.

This well-known saying, that a shoemaker should not go beyond his last, originated with Apelles, the celebrated Greek painter, who set a picture which he had finished in a public place, and concealed himself behind it, in order to hear the criticisms of passers-by. A shoemaker observed a defect in the shoe, and the painter forthwith corrected it. The cobbler came again the next day, and encouraged by the success of his first remark, began to extend his censure to the leg of the figure; when the angry painter thrust out his head from behind the picture, and told the shoemaker to keep to his trade.

MANNERS MAKYTH MAN.

William of Wykeham, when his growing honors required that he should adopt a coat-of-arms, with a humility not less amiable than wise in a *novus homo*, sealed with the chevron; the chevron being, as the learned herald, Nicholas Upton, has it, one of those bearings which *per carpentarias et domorum factores olim portabantur*. To this seal he added the celebrated motto: "Manners makyth man."

ALL IS LOST, SAVE HONOR.

It was on the day of the fatal battle of Pavia that Francis I. wrote his mother a letter containing the oft-quoted words, "All is lost, madam, save honor."

CÆSAR'S WIFE MUST BE ABOVE SUSPICION.

This proverb has, doubtless, arisen from a passage in *Plutarch's Cæsar*, (Cap. 10,) or from a passage in Suetonius, which says that "the name of Pompeia, the wife of Julius Cæsar, having been mixed up with an accusation against P. Clodius, her husband divorced her; not, as he said, because he believed the charge against her, but because he would have those belonging to him as free from suspicion as from crime."

ACCORDING TO GUNTER.

This expression is undoubtedly derived from the name of the celebrated English mathematician, Edward Gunter, who was born in 1581. He was the author of various works, and what is more to our purpose, made several practical inventions, the chief of which is known as Gunter's Line, a logarithmic line, usually laid down upon scales, sectors, &c. It is also called the *line of lines*, and line of numbers, being only the logarithms graduated upon a ruler, which therefore serves to solve

problems instrumentally in the same manner as logarithms do arithmetically. His other inventions were, Gunter's Quadrant, and Gunter's Scale. This last is generally called by seamen *the Gunter*, and it is probably from this more especially that the name is derived. It is an instrument by means of which questions in navigation, trigonometry, &c., are solved with the aid of a pair of compasses.

UNDER THE ROSE.

The expression "under the rose," took its origin from the wars between the Houses of York and Lancaster. The parties respectively swore by the red or the white rose, and these "opposite emblems were displayed as the signs of two taverns; one of which was by the side of, and the other opposite to, the Parliament House, in Old Palace Yard, Westminster. Here the retainers and servants of the noblemen attached to the Duke of York and Henry Sixth used to meet. Here, also, as disturbances were frequent, measures, either of defence or annoyance, were taken, and every transaction was said to be done "under the rose;" by which expression the most profound secrecy was implied. According to others, this term originated in the fable of Cupid giving the rose to Harpocrates, the god of silence, as a bribe to prevent him betraying the amours of Venus, and was hence adopted as the emblem of silence. The rose was for this reason frequently sculptured on the ceilings of drinking and feasting rooms, as a warning to the guests that what was said in moments of conviviality should not be repeated; from which, what was intended to be kept secret was said to be held "under the rose." Roses were consecrated as presents from the Pope. In 1526 they were placed over confessionals, as the symbols of secrecy. Hence, according to some, the origin of the phrase."—*Notes and Queries.*

DIEU ET MON DROIT.

Dieu et mon droit, (signifying God and my right,) the motto of the royal arms of England, was first assumed by King Richard I., to intimate that he did not hold his empire in vassalage of any mortal. It was afterwards taken up by Edward the Third, and was continued without interruption to the time of William the Third, who used the motto "*Je maintiendray*," though the former was still retained upon the great seal. After him, Queen Anne used the motto "*Semper Eadem*," which had been before used by Queen Elizabeth, but since Anne's time, "Dieu et mon droit" has continued to be the royal motto.—Dr. MAUNDERS.

STRIKE; BUT HEAR ME!

When, in the synod of Peloponnesian chiefs, Themistocles re-opened the discussion, and prematurely expressed his fears and anxiety as to the abandonment of Salamis, the Corinthian Adeimantus rebuked him by saying: "Themistocles, those who in the public festival-matches rise up before the proper signal, are scourged." "True (re-joined the Athenian); but those who lag behind the signal win no crowns." Adeimantus then lifted up his stick to strike Themistocles; upon which the latter addressed to him the well-known observation, "Strike; but hear me!"

THE PILOT THAT WEATHERED THE STORM.

This phrase was applied by Canning to Pitt, the darling minister.

Middleton, in his *Life of Cicero*, quoting the Familiar Letters, says: "He oft compares the statesman to the pilot, whose art consists in managing every turn of the winds, and applying even the most perverse to the progress of his voyage; so as by changing his course, and enlarging his circuit of sailing, to arrive with safety, though later, at his destined port."

AS RICH AS CRŒSUS.

The wealth of Crœsus, which has passed into a proverb, has been variously accounted for. The possessors of Sardis, the capital of the Lydian kings, were enriched by the neighborhood of the river Pactolus, which flowed down from Mount Tmolus towards the Hermes, and brought with it considerable quantities of gold in its sands. To this cause historians often ascribe the abundant treasures belonging to Crœsus and his predecessors; but Crœsus possessed besides other mines near Pergamus, and another cause of wealth is also to be found in the general industry of the Lydian people. They were the first (according to Herodotus) who ever carried on retail trade, and the first to coin money of gold and silver.

EVERY MAN IS THE ARCHITECT OF HIS OWN FORTUNES.

Was the professional figure employed by Appius Claudius the Blind, and borrowed from his occupation as an architect in former years. He is said to have introduced it in the appeal by which Rome became the mistress of the world.

WOODEN WALLS.

When the Athenian envoys consulted the Delphian oracle as to their hopes at Salamis, the priestess assured them "the wooden wall

alone should remain unconquered." The people inquired what was meant by the "wooden wall." Some supposed that the Acropolis, itself, which had been originally surrounded with a wooden palisade, was the refuge pointed out; but the greater number, and among them the most of those who were by profession expositors of prophecy, maintained that the wooden wall indicated the fleet, as it does to this day, in the national boast of the "wooden walls of Old England."

FREE TRADE.

One of the earliest uses of this phrase occurred on the opening of the Irish Parliament in 1777, when Hussey Burgh moved the address to the king, in which was the following sentence: "It is not by temporary expedients, but by an extension of trade, that Ireland can be ameliorated." Flood, who was seated in the vice-treasurer's place, said audibly: "*Why not a free trade?*" The amendment electrified the house; the words were adopted, and the motion was carried unanimously.

FULL TO THE BRIM

Is a common phrase, used erroneously to denote a vessel entirely filled; since a cup may be filled to the brim, or edge, and not full in the centre; for fluids do not form a surface perfectly horizontal in vessels to which they adhere so as to wet them; but they rise, on the contrary, around the brim of the vessels. Hence, a cup is not absolutely full when it appears so at the edge. Fluids, on the other hand, in vessels to which they do not adhere, sink around the brim, and rise in the centre. Thus, quicksilver in a glass forms a convex surface.

BLACK BOOKS.

To be in the Black Books implies out of favor; a phrase said to be borrowed from the black book of the English monasteries, which was a detail of the scandalous enormities practised in religious houses. It was compiled by order of the visitors under Henry VIII., to blacken them, and thus hasten their dissolution. Books which relate to necromancy are also called black books; but of much earlier date is the black book of the exchequer, said to have been composed in the year 1175, by Gervase of Tilbury, nephew of Henry II.

VENI, VIDI, VICI.

In these memorable words Cæsar announced the victory which he gained over Pharnaces, at Zela, in Asia Minor.

An account of this victory, with all the circumstances attending it, will be found in Cæsar's Commentaries *De Bello Alexandrino*, but without any mention of the words "*Veni, vidi, vici.*" The authority for these is in Plutarch's life of Cæsar, where we read that when Cæsar celebrated his Pontic triumph, the well-known words were eagerly caught at and made a prominent figure in the spectacle—so, at least, we learn from Suetonius: *Pontico triumpho inter pompæ fercula trium verborum prætulit titulum—"Veni, vidi, vici;" non acta belli significantem, sicut cæteri, sed celeriter confecti notam.*

THE BED OF PROCRUSTES.

Procrustes, called by Pausanias Polypæmon, was, in mythology, a robber of ancient Greece, who placed on an iron bed the travellers who fell into his hands, which their stature was made to fit by cutting off the projecting limbs, or by stretching them to suit its dimensions: whence the metaphorical expression of *the Bed of Procrustes.*

NO ROYAL ROAD TO GEOMETRY.

Euclid, who opened a school of mathematics at Alexandria, in the reign of the first Ptolemy, was once asked by that sovereign whether he could not explain his art to him in a more compendious way; to which Euclid made the celebrated answer, that there was no royal road to geometry.

EX PEDE HERCULEM.

The following origin of this proverb is to be found quoted by Aulus Gellius, from Plutarch:

Pythagoras ingeniously calculated the great stature of Hercules by comparing the length of various stadia in Greece. All these courses were nominally 600 feet in length; but Hercules was said to have measured out the stadium at Olympia with his own feet, while the others followed a standard of later days. The philosopher argued that by how much the Olympic course exceeded all others in length, by the said proportion did the foot of Hercules exceed that of men of a subsequent age; and again, by the same proportion must the stature of Hercules have been pre-eminent.

Several proverbs of a similar meaning are collected in *Diogenian*, vol. iv.: the most common is *ex ungue leonem.*

WHAT IS PEGASUS?

Pegasus was, strictly speaking, Bellerophon's horse; but in the *Destruction of Troy*, 4to., 1617, we read, "of the blood that issued out (from Medusa's head) there engendered Pegasus, or the *flying horse*. By the flying-horse that was engendered of the blood issued from her head, is understood that of her riches issuing of that realme he (Perseus) founded, and made a ship named Pegase, and *this ship was likened unto an horse flying*," &c. In another place we are told that this ship, which the writer always calls Perseus' flying horse, "flew on the sea like unto a bird."

THE MANDRAKE

Is named from a German term, resembling man, its forked root being like the lower half of the human figure; and if the plant be pulled when the fruit is ripe, one of the berries may be supposed to represent the head and complete the figure.

> "Mark how that rooted mandrake wears
> His human feet, his human hands."—*Lanhorne's Beeflower*.

It was once believed that the person who pulled up a mandrake would instantaneously fall dead; that the root shrieked or groaned when separated from the earth; and that whoever heard the shriek died shortly after, or became afflicted with madness: or,

> "Torn out of the earth,
> That living mortals, hearing them, run mad."
> *Romeo and Juliet*.
> "Would curses kill, as doth the bitter mandrake's groan."
> *Henry VI*. part ii.

Still, if the root were once dislodged, it became the good genius of its possessor. This was done by fastening the tail of a dog by cords to the bottom of the stem, and then the animal was whipped until, by its struggles, the plant was dragged up; the persons who directed the operation having their ears stopped with pitch, lest they should hear the fatal groan. The dog, of course, fell dead at the time, or soon after. The mandrake is belived to be the *duadim* of the Hebrews, the plant so coveted by Rachel in Scripture.

THE SWORD OF DAMOCLES.

Damocles was a flatterer of the tyrant Dionysius, who, to show him how little was the value of grandeur in the midst of terror, caused a sword to be suspended by a horsehair over the parasite's head, as he

sat amidst the enjoyments of the banquet. Hence "the sword of Damocles" denotes imminent danger in fancied security. Sir Thomas Browne says: "There is no Damocles like unto self-opinion."

ARGUS AND HIS HUNDRED EYES.

Argus was one of the mythological heroes of Ovid, and was fabled to have a hundred eyes, of which two only slept in succession. On this account, Juno sent him to watch Io; when Mercury, by command of Jupiter, lulled Argus to sleep with the music of his flute, and then killed him. Juno then transferred Argus's eyes to the tail of the peacock.

FROGS—WHY FRENCHMEN WERE SO CALLED.

"*Qu'en disent les grenouilles?*" was the common flippant phrase at Versailles (about 1791), when any new absurdity was planned, meaning, "What will the frogs say to this?" The French court, in allusion to the quaggy state of Paris formerly, when known by the name of "Lutetia," called its inhabitants "frogs."—*Piozzi's Retrospections.*

DEAD AS A DOOR-NAIL.

This proverbial expression is taken from the door-nail: that is, the nail on which, in old doors, the knocker strikes. It is therefore used as a comparison to any one irrecoverably dead; one who has fallen (as Virgil says) *multa morte*, i. e. with abundant death, such as reiteration of strokes on the head would naturally produce:

> "*Falstaff.* What! Is the old king dead?
> *Pistol.* As nail in door."—*Shakspeare's Henry IV.*

BY HOOK OR BY CROOK.

This proverb is said to have arisen in the time of Charles I., when there were two learned judges, Hooke and Crooke, and a difficult cause was to have been gotten either by Hooke or by Crooke. Spenser, however, mentions these words twice in his *Faery Queene*, which is a proof that this proverb is much older than that time; and that the phrase was not then used as a proverb, but applied as a pun.—*Warton.*

A MS. of 1618 states that, when King Henry II. landed in Ireland in 1172, it was at a place in the "Bay of Waterford, called y[e] Crook, over against y[e] tower of y[e] Hook, whence arose the proverb, 'by Hook or by Crook,' it being safe to gain land in one of those places, when the wind drives from the other."

KNOWLEDGE IS POWER.

This familiar phrase is from Bacon, yet not from the "Advancement of Learning," as is generally supposed, but from his treatise "de Hæresibus." The maxim, which is parenthetical, is in the following terms:—"Nam et ipsa scientia potestas est." It occurs in the treatise de Hæresibus, i. e. on sects and opinions, but is not used precisely in the sense attached to it in the present day. Bacon is describing a sect which entertains particular notions on the subject of predestination. He says they give wider limits to the knowledge than to the power of God, implying that He may foreknow acts without necessarily preordaining them, or rather, he remarks they restrict His power of doing, more than His power of knowing; for knowledge itself is a power. His meaning is that the capacity to know may be termed a power, not that knowledge confers power. The following is the sentence in which it occurs: "Tertius gradus est eorum qui arctant et restringunt opinionem priorem tantum ad actiones humanas quæ participant ex peccato quos volunt substantive absque nexu aliquo causarum ex interna voluntate et arbitrio humano pendere, statuuntque latiores terminos scientiæ Dei quam potestatis Dei (nam et ipsa scientia potestas est) qua scit quam ejus qua movit et agit; ut præsciet quædam otiose quæ non prædestinet et præordinet."

Without entering into the metaphysical question, one may indicate the popular sense of the maxim by quoting a sentence written 2,500 years before Bacon saw the light: "A wise man is strong; yea, a man of knowledge increaseth strength;" or thus, "A wise man is in strength; yea, a man of knowledge strengtheneth in might."

Sir Edward Bulwer is therefore mistaken when he says in "My Novel," that no such sentence or thought is to be found in Bacon's Works.

A ROWLAND FOR AN OLIVER.

These were two of the most famous in the list of Charlemagne's twelve peers; and their exploits were rendered so ridiculously and equally extravagant by the old romancers, that from thence arose that saying amongst our plain and sensible ancestors of giving one a "Rowland for an Oliver," to signify the matching one incredible lie with another.—*Warburton.*

THE GRAY MARE WILL PROVE THE BETTER HORSE.

Mr. Macaulay says that this proverb originated in the preference usually given to the gray mares of Flanders over the finest coach-horses

of England. The line occurs in Prior's Epilogue to Lucius, in Hudibras, and the Marriage of Wit and Science, which dates from 1569.

WHAT IS QUACKERY?

The appellation of quack, says Dr. Parr, arose from *quacksalber*, the German name for quicksilver; since on the first appearance of syphilis, the irregular practitioners only employed this reputedly dangerous medicine. At present the term *quack* is confined to those who sell a pretended nostrum, the preparation of which is kept secret; but it may be applied to every practitioner who, by pompous pretences, mean insinuations, and indirect promises, endeavors to obtain that confidence which neither success nor experience entitles him to.—*Dr. Macaulay's Dictionary of Medicine*, 12th. edit. 1854.

The term quack, to brag loudly, is as old as the time of Butler:

> "Believe mechanick virtuosi
> Can raise them mountains in Potosi,
> Seek out for plants with signatures,
> To quack of universal cures."—*Hudibras.*

The general application of the term to boastful pretenders is also old; for Sir R. l'Estrange speaks of "the change, schools, and pulpits," being "full of quacks, jugglers, and plagiaries." Johnson gives *quacksalver*, from *quack* and *salve*, and illustrates from Brown and Burton.

Useful and esteemed remedies have at first appeared in the disreputable form of secret remedies. Such was Dover's powder (opium and ipecacuanha), named from its inventor, who published it at first with an air of mystery, hitching in a line of Pope:

> "See, desperate misery lays hold on Dover."

THROWING A TUB TO THE WHALE

Originated in the practice of the sailors of Greenland and South-Sea whaling ships, when surrounded with a dangerous number of whales, throwing out a tub to divert their attention; meanwhile every sail is hoisted, and the vessel pursues its course. This is one of the illustrations of Swift's *Tale of a Tub*. In argument, to give an adversary a pretended advantage, to mislead him, is to throw a tub to the whale.

TAILORS' "CABBAGE."

The word Cabbage, by which all the varieties of *Brassica* are now called, means the firm head or ball that is formed by the leaves turn-

ing closely over each other; from which circumstance we say the cole has cabbaged, the lettuce has cabbaged, the tailor has cabbaged. Arbuthnot, in his *History of John Bull*, says: "Your tailor, instead of shreds, cabbages whole yards of cloth." Hence arose the cant-word applied to tailors, who formerly worked at the private houses of their customers, where they were often accused of *cabbaging*, *i. e.* rolling up pieces of cloth, instead of the list and shreds which they claimed as their due.

HOBSON'S CHOICE.

Tobias Hobson was the first man in England that let out hackney horses. When a man came for a horse, he was led into the stables, where there was a great choice, but he obliged him to take the horse which stood next to the stable door: so that every customer was alike well served according to his chance, from whence it became a proverb, when what ought to be your election was forced upon you, to say Hobson's choice.—*Spectator*, *No.* 509. This derivation is, however, denied by Mr. Bellenden Ker, in his "Archæology of our Popular Phrases," who calls it a Cambridge hoax.

HOME, SWEET HOME.

The beautiful words of this now so celebrated song were written by John Howard Paine, an American, who was very early in his life upon the stage as an "infant phenomenon;" and who, after a singularly varied career, died a year or two since, when Consul for the United States at Tunis. He wrote them one Sunday in an upper room in the Palais Royal at Paris. It is needless to add, that the music to which the words are sung is of far older date.

THE STYLE OF YOUR MAJESTY.

Up to the time of the Emperor Charles V., when a king of France England, or Spain, was addressed, he was styled "Your Grace;" but Charles, wishing to place himself in a higher rank than other monarchs, demanded the title of "Majesty;" a distinction which did not long continue, for the other sovereigns of Europe quickly followed his example; and in our day all kings, whether rulers of small or great states, are equally styled "Your Majesty."

"THE KING NEVER DIES."

Upon the death or demise of the king, his heir is that moment invested with the kingly office and royal power, and commences his

reign the same day his ancestor dies; hence it is held a maxim that the king never dies.—LORD BACON'S *Abridgment.*

MEN OF STRAW.

Many years ago, men could be easily found to give any evidence, upon oath, that might be required: and some of these persons walked openly in Westminster Hall with a straw in one of their shoes, to signify they wanted employment as witnesses; hence originated the saying "he is a Man of Straw." But the custom has high antiquity. A writer in the *Quarterly Review* (vol. xxxiii. p. 344), on Greek Courts, says: "We have all heard of a race of men who used in former days to ply about our own courts of law, and who, from their manner of making known their occupation, were recognized by the name of *straw shoes.* An advocate or lawyer who wanted a *convenient* witness, knew by these signs where to find one, and the colloquy between the parties was brief. 'Don't you remember?' said the advocate—(the party looked at the fee and gave no sign; but the fee increased, and the powers of memory increased with it)—'To be sure I do.' 'Then come into court and swear it!' And straw shoes went into court and swore it. Athens abounded in straw shoes."

Though a straw in the shoe has ceased to be the distinguishing mark, the records of many of our courts show that "men of straw" still exist, and are easily found by those unprincipled enough to require their services. They are now, however, principally employed as bail; and "straw bail," has become a familiar word in all our courts. Their false oath of the possession of property is often a ready means of snatching felons from the custody of the law.

EVERY MAN HAS HIS PRICE.

Sir Robert Walpole, the Grand Corrupter, as he was called in the libels of his time, is said to have thought all mankind rogues, and to have remarked that every one had his price. That Walpole said something very much like the saying attributed to him, is what even his son does not deny; but there is reason to believe that he said it with a qualification—"all *those* men have their price," not "all men have their price." The saying as recorded by Richardson, the painter, who had ample means of being well informed, was in these words: "There was not one, how patriot soever he might seem, of whom he did not know the price."

Dr. Ring records a remark made during a debate in Parliament by Walpole to Mr. Leveson, brother of the Jacobite Lord Gower.

"You see," said Sir Robert, "with what zeal and vehemence those gentlemen oppose, and yet I know the price of every man in this House except three, and your brother is one of them." Walpole's son, speaking of his father, observed to Pinkerton: "Sir Robert Walpole used to say, that it was fortunate so few men could be prime ministers, as it was best that few should thoroughly know the shocking wickedness of mankind. I never heard him say that all men had their prices; and I believe no such expression ever came from his mouth."—*Walpoliana.*

HIP, HIP HURRAH!

This is said to have been originally a war cry, adopted by the assailants of a German city, in which many Jews had taken refuge. The place was taken and they were all put to the sword, amid shouts of *Hierosolyma est perdita!* and from the first letters of these words an exclamation was contrived.

THE WISE MEN OF GOTHAM.

At a last holden at Westham, October 3d, 24th Henry VIII., for the purpose of preventing unauthorized persons from setting "nettes, pottes, and innoyances, or anywise taking fish, within the privilege of the march of Pevensey, the king's commission was directed to John prior of Lewes, Richard abbot of Begeham, John prior of Myehillym, Thomas Lord Dacre, and others." Upon the proceedings of this meeting, which was held at Gotham, near Pevensey, the facetious Andrew Borde, a native of that town, founded his *Merrie Tales of the Wise Men of Gotham.*

Another derivation of this phrase, given in Thoroton's Nottinghamshire, is, that when King John in one of his "progresses" was about to pass through Gotham towards Nottingham, he was prevented by the inhabitants, who thought that the ground over which a king passed became for ever after a public road. The king was naturally incensed at this incivility, and sent some persons to punish the inhabitants, who bethought themselves of an expedient for avoiding the king's wrath. The messengers, on their arrival, found all the people engaged in some foolish occupation or other, so that they returned to the court and reported that Gotham was a village of fools.

In Drunken Barnaby's journal are these lines:

Veni Gotham ubi multos
Si non omnes vidi stultos.

"Thence to Gotham where sure am I,
If though not *all* fools, saw I *many*."

A FEATHER IN HIS CAP.

In the British Museum are two MSS. descriptive of Hungary in 1598, in which the writer says of the inhabitants: "It hath been an auncient custome amongst them, that none should weare a fether but he who had killed a Turk, to whome onlie yt was lawfull to shew the number of his slaine enemyes by the number of fethers in his cappe." Does not this passage explain the phrase, "That will be a feather in his cap?"

GONE TO JERICHO.

In the Patent Rolls of the manor of Blackmore, near Colchester, occurs (18th February, 1528–9) an entry of a tenement called *Jericho*, reported to have been one of the king's pleasure-houses. Hence, when the luxurious monarch was missing, the cant phrase among the courtiers was that "he was gone to Jericho."—CAMDEN, *Miscellany*, vol. iii.

MIND YOUR P's AND Q's.

The most probable derivation of this phrase is, that it comes from the printing office, and rose from the fact that the *p's* and *q's* in Roman type vary but slightly in form, and that when reversed, as they necessarily are in type, they are easily confounded by young compositors. Another derivation refers it to the "scot" written up in the ale-house, where P and Q were used to designate *pints* and *quarts*. Still another derivation refers it to the *toupées* and *queues* of olden times.

CURIOUS ORIGIN OF SOME WORDS.

Dr. Latham, in his Grammar, gives curious instances of the misspelling of words arising from their sound, which error has led to the production not only of a form, but of a meaning very different from the original. Thus, *Dent de lion*, originally referring to the root, has been corrupted into *dandylion*, having reference to the flaunting aspect of the flower. *Contre-dance* has become *country dance*; *Shamefastness*, originally referring to the attire, has been converted into *shamefacedness*, and applied to the countenance. *Cap-a-piè* has produced *apple-pie* order. *Folio capo*, Italian for the first sized sheet, has produced *foolscap*. *Asparagus*, *sparrowgrass*, *Girasole artichoke*, *Jerusalem artichoke*. *Massaniello*, the name of the famous Neapolitan rebel and the hero of the opera, is nothing but *Mas-Aniello*, a corruption of the true name *Thomas Aniello*. *Hogoumont*, famous in the annals of Waterloo, is properly *Chateau Goumont*.

LIVERY, AND LIVERY STABLES.

Livery, *i. e.* delivery, is from the French *livrer*, to deliver. Chaucer has, "the conisance of my livery to all my servants *delivered.*" Spenser, in his work on Ireland, says: "What *livery* is, we, by common use in England, know well enough, namely, that it is allowance of horse-meate, as they commonly use the word in stabling as to keepe horses at *livery;* the which word, I guess, is derived of *livering* or delivering forth their nightly food. So, in great houses, the livery is said to be served up for all night, that is, their evening's allowance for drinke. And livery is also called the upper weede which a serving-man weareth, so called (as I suppose) for that it was delivered and taken from him at pleasure."

ORIGIN OF FARM.

Spelman derives this word from the Saxon *fearme* or *feorme*, which signifies *victus*, food or provision; as the tenants and country-people anciently paid their rents in victuals and other necessaries of life. Hence a *farm* was originally a place which supplied its owner or lord with provisions. The word *ferme* is also French, and a farm is probably so called from its being a firm or fixed possession of the land by one who labors on it.

ERRONEOUS BIBLE QUOTATIONS.

The apple is a fruit never connected in Scripture with the fall of man; Eve was not Adam's helpmate, but merely a help meet for him. Absalom's long hair, of which he was proud, and which has consequently so often served "to point a moral and adorn a tale," had nothing to do with his death, his head, and not the hair upon it, having been caught in the boughs of the tree. (2 *Sam.* xviii. 9.)

The phrase, "God tempers the wind to the shorn lamb," is by many considered as being in the Bible. It is, however, from Sterne's "Sentimental Journey;" though in a collection of proverbs published in 1594 we find "Dieu mesure le vent á la brebis tondue," while Herbert in his Jacula Prudentum has, "To a close shorn sheep God gives wind by measure."

FAMILIAR QUOTATIONS.

There are many phrases and quotations which are as "familiar in our mouths as household words," whose origin is either unknown or misconceived, and without encroaching upon the sphere of the works devoted to this purpose, we may mention a few of them:

"There is death in the pot," is from the Bible, 2 Kings iv. 40. "Lovely and pleasant in their lives, and in death they were not divided," is spoken of Saul and Jonathan, 2 Samuel i. 23. "A man after his own heart," 1 Samuel xiii. 14." "The apple of his eye," Deut. xix. 21. "A still small voice," 1 Kings xix. 12. "Escaped with the skin of my teeth," Job xix. 20. "That mine adversary had written a book," Job xxi. 35. "Spreading himself like a green bay-tree," Psalm xxxvii. 35. "Hanged our harps upon the willows," Psalm cxxxvii. 2. "Riches certainly make (not *take*, as it is often quoted) themselves wings," Proverbs xxiii. 5. "Heap coals of fire upon his head," Ibid. xxv. 22. "No new thing under the sun," Ecclesiastes i. 9. "Of making many books there is no end," Ibid. xii. 12. "Peace, peace, when there is no peace" (made famous by Patrick Henry), Jeremiah viii. 11. "My name is Legion," Mark v. 9. "To kick against the pricks," Acts ix. 5. "Make a virtue of necessity," Shakespeare's Two Gentlemen of Verona. "All that glisters is not gold," usually quoted, "All is not gold that glitters," Merchant of Venice. "Screw your courage to the sticking *place*" (not *point*), Macbeth. "Make assurance doubly sure," Ibid. "Hang out our banners on the outward (not outer) walls," Ibid. "Keep the word of promise to *our* (not *the*) ear but break it to our hope," Ibid. "It is an ill wind turns none to good," usually quoted, "It's an ill wind that blows no one any good," Thomas Tasser, 1580. "Christmas comes but once a year," Ibid. "Look, ere thou leap," Ibid.; and "look before you, ere you leap," Hudibras, commonly quoted, "Look, before you leap." "Out of minde as soon as out of sight," usually quoted, "Out of sight, out of mind," Lord Brooke. "What though the field be lost, all is not lost," Milton. "Awake, arise, or be for ever fallen," Ibid. "Necessity, the tyrant's plea," Ibid. "That old man, eloquent," Ibid. "Peace hath her victories," Ibid. "Though this may be play to you, 'tis death to us," Roger L'Estrange, 1704. "All cry and no wool" (not *little* wool), Hudibras. "Count their chickens ere (not before) they're hatched," Ibid. "Through thick and thin," Dryden. "When Greeks joined Greeks, then was the tug of war," usually quoted, "When Greek meets Greek, then comes the tug of war," Nathaniel Lee, 1692. "Of two evils, I have chose the least," Prior. "Richard is himself again," Colley Cibber. "Classic ground," Addison. "As clear as a whistle," Byron, 1763. "A good hater," Johnsoniana. "A fellow feeling makes one (not *us*) wondrous kind." "My name is Norval," John Home, 1808. "Ask me no questions, and I'll tell you no fibs," Goldsmith. "Not much the worse for wear" (not *none*

the worse), Cowper. "What will Mrs. Grundy say," Thomas Morton. "No pent up Utica contracts your powers," Jonathan M. Sewall. "Hath given hostages to fortune," Bacon. "His (God's) image cut in ebony," Thomas Fuller. "Wise and masterly inactivity," Mackintosh, in 1791, though generally attributed to Randolph. "First in war, first in peace, and first in the hearts of his fellow-citizens" (not *countrymen*), resolutions presented to House of Representatives, Dec., 1799. Prepared by Gen. Henry Lee. "Millions for defence, but not one cent for tribute," Charles C. Pinckney. "The Almighty Dollar," Washington Irving. "As good as a play," King Charles, when in Parliament, attending the discussion of Lord Ross's Divorce Bill. "Selling a bargain," is in Love's Labour Lost. "Fast and loose," Ibid. "Pumping a man," Ottway's Venice Preserved. "Go snacks," Pope's prologue to Satires. "In the wrong box," Fox's Martyrs. "To lamm in the sense of to heal, King and no King, by Beaumont and Fletcher." The hackneyed newspaper Latin quotation, "Tempora mutantur, nos et mutamur in illis," is not found in any classic or Latin author. The nearest approach to it was, "Omnia mutantur, &c.," and this is found in Borbonius, a German writer of the middle ages.

"Smelling of the lamp" is to be found in Plutarch, and is there attributed to Pytheas. "A little bird told me," comes from Ecclesiastes x. 20. "for a bird of the air shall carry the voice, and that which hath wings shall tell the matter."

He that fights and runs away,
May live to fight another day.

These lines, usually ascribed to Hudibras, are really much older. They are to be found in a book published in 1656. The same idea is however expressed in a couplet published in 1542, while one of the few fragments of Menander, the Greek writer, that have been preserved, embodies the same idea in a single line. The couplet in Hudibras is,

For those that fly may fight again,
Which he can never do that's slain.

"Hell is paved with good intentions," though found in Johnson and Herbert, was obviously in their day a proverbial expression. Walter Scott ascribes it to "some stern old divine."

There's a good time coming, is an expression used by Sir Walter Scott in Rob Roy, and has doubtless, for a long time, been a familiar saying in Scotland.

Eripuit cælo fulmen, sceptrumque tyrannis, was a line upon

Franklin written by Turgot, the minister of Louis XVI. It is, however, merely a modification of a line by Cardinal Polignac, *Eripuitque Jovi fulmen, Phœboque sagittas*, which in turn was taken from a line of Marcus Manilius, who says of Epicurus *Eripuitque Jovi fulmen viresque Tonanti.*

Vox populi, Vox Dei. The origin of this familiar phrase is not known, but it is quoted as a proverb by William of Malmesbury, who lived in the early part of the twelfth century.

Ultima ratio regum. This motto was engraved on the French cannon by order of Louis XIV.

Whistling girls and crowing hens
Always come to some bad end.

In one of the curious Chinese books recently translated and published in Paris, this proverb occurs in substantially the same words. It is also an injunction of the Chinese priesthood, and a carefully observed household custom, to kill immediately every hen that crows, as a preventive against the misfortune which the circumstance is supposed to indicate. The same practico provails throughout many portions of the United States.

CUSTOMS, MANNERS, AND LAWS.

PAWNBROKERS' THREE BALLS.

This sign was taken from that of the Italian bankers, generally called Lombards, who were the first to open loan-shops in England for the relief of temporary distress. The greatest of the Lombards were the celebrated and eventually princely house of the Medici of Florence. They bore pills on their shield (and those pills, as usual then, were gilded), in allusion to the professional origin from whence they had derived the namo of Medici; whence their agents in England and other countries placed their armorial bearings over their doors, and others adopted the sign.

SALUTE OF A HUNDRED-AND-ONE GUNS.

Opinions are divided as to the origin of firing 101 rounds on great occasions. Some imagine it to be deduced from the German custom of adding one on almost every occasion,—a custom observable even in the German law, and which has descended into trade and the ordinary affairs of life. Others prefer the following historical origin: On the triumphant return of Maximilian to Germany after a successful campaign, a brilliant reception was offered to the monarch by the town of Augsburg, and a hundred rounds of cannon were ordered to be discharged on the occasion. The officer on service, fearing to have neglected the exact number, caused an extra round to be added. The town of Nuremburg, which Maximilian next visited, desirous to prove itself equally loyal, also ordered a like salute; whence, it is said, proceeds the custom that has descended to our day.

THE BARBER'S POLE.

The Barber-Surgeon was formerly known by his Pole at the door. The pole was used by the barber-surgeon for the patient to grasp in blood-letting, a fillet or bandaging being used for tying his arm. When the pole was not in use, the tape was tied to it, and twisted round it; and thus both were hung up as a sign. At length, instead of hanging out the actual pole used in the operation, a pole was painted with stripes round it, in imitation of the real pole and its bandages; hence the barber's pole.

Lord Thurlow, in his speech for postponing the further reading of the Surgeons' Incorporation Bill, July 17, 1797, stated, that, "by a statute still in force the barbers and surgeons were each to use a pole."

Even in our generation there have been barbers in England who let blood and drew teeth, and to the present day the Spanish *Sangrador* cuts your hair and lets your blood indifferently.

THE SIR-LOIN OF BEEF.

There is a laughable tradition current in Lancashire, that King James I., in one of his visits there, knighted at a banquet in Houghton Tower, near Blackburn, a loin of beef, the part ever since called the *Sir-loin*. Dr. Pegge, however (*Gent. Mag.* vol. liv. p. 485), conceives the word to be "compounded of the French *sur*, upon, and the English *loin*, for the sake of euphony, our particles not easily submitting to composition. In proof of this, the piece of beef so called grows upon the *loin*, and behind the small ribs of the animal." The tradition is also related as a waggish freak of Charles II. Hence the epigram:

"Our second *Charles*, of fame facete,
On loin of beef did dine;
He held his sword pleased o'er the meat,
'Rise up thou famed Sir-loin!'"

LOOKING BACK.

The superstition of the ill-luck of Looking Back, or returning, is nearly as old as the world itself, having doubtless originated in Lot's wife "having looked back from behind him," when he was led, with his family and cattle, by an angel outside the doomed City of the Plain (Genesis xix. 26). Whether walking or riding, the wife was behind the husband, according to a usage still prevalent in the East, where no woman goes beside her husband. In Robert's *Oriental Illustrations* it is stated to be "considered exceedingly unfortunate in Hindostan

for men or women to look back when they leave their house. Accordingly, if a man goes out and leaves something behind him which his wife knows he will want, she does not call him to turn or look back, but takes or sends it after him; and, if some great emergency obliges him to look back, he will not then proceed on the business he was about to transact. If we mistake not, a similar feeling is entertained in some parts of England, though not carried so far into operation."

THIRTEEN TO DINNER.

There is a prejudice existing, generally, on the pretended danger of being the thirteenth at table. If the probability be required, that out of thirteen persons, of different ages, one of them, at least, shall die within a year, it will be found that the chances are about one to one that one death, at least, will occur. This calculation, by means of a false interpretation, has given rise to the prejudice, no less ridiculous, that the danger will be avoided by inviting a greater number of guests, which can only have the effect of augmenting the probability of the event so much apprehended.—QUETELET *on the Calculation of Probabilities*.

SIGNATURE OF THE CROSS.

The mark which persons who are unable to write are required to make, instead of their signature, is in the form of a cross (+); and this practice having formerly been followed by kings and nobles, is constantly referred to as an instance of the deplorable ignorance of ancient times. This signature is not, however, invariably a proof of such ignorance: anciently, the use of this mark was not confined to illiterate persons; for, amongst the Saxons the mark of the cross, as an attestation of the good faith of the person signing, was required to be attached to the signature of those who could write, as well as to stand in the place of the signature of those who could not write. In those times, if a man could write, or even read, his knowledge was considered proof presumptive that he was in holy orders. The word *clericus*, or *clerk*, was synonymous with penman; and the laity, or people who were not clerks, did not feel any urgent necessity for the use of letters. The ancient use of the cross was, therefore, universal, alike by those who could and those who could not write; it was, indeed, the symbol of an oath, from its holy associations, and, generally, *the mark*. On this account, the editor of the *Pictorial Shakspeare*

explains the expression of "God save the mark," as a form of ejaculation approaching to the character of an oath.

THE PRIVILEGE OF SANCTUARY.

By this very ancient and curious Saxon law, if a person accused of any crime—excepting treason and sacrilege, in which the crown and the Church were too nearly concerned,—had fled to any church or churchyard, and within forty days after went before the coroner, made a full confession of his crime, and took the oath provided in that case, that he would quit the realm, and never return again without leave of the king, his life should be safe. At the taking of this oath he was brought to the church-door, where being branded with an A, signifying "abjured," upon the brawn of the thumb of his right hand, a port was then assigned to him from which he was to leave the realm, and to which he was to make all speed, holding a cross in his hand, and not turning out of the highway either to the right hand or the left. At this port he was diligently to seek for passage, waiting there but one ebb and flood, if he could immediately procure it; and if not, he was to go every day into the sea up to his knees, essaying to pass over. If this could not be accomplished within forty days, he was again to put himself into sanctuary. These privileges of sanctuary and abjuration were taken away in 1621 by the statute of 21st James I. Sanctuary was also a sacred asylum.

CANDLEMAS

Is evidently traceable to the ancient custom of lighting up churches and chapels with candles and lamps, and carrying them in procession. This practice of lighting has been discontinued in England since the second year of Edward VI.; in the Romish Church the original name and all its attendant ceremonies, are still retained. Herbert, in his *Country Parson*, refers to a relic of this practice in the custom of saying, "when light is brought in, *God sends us the light of Heaven*,—and the parson likes this very well. Light is a great blessing, and as great as food, for which we give thanks; and those that think this superstitious, neither know superstition nor themselves."

THROWING THE OLD SHOE.

The old custom of Throwing an Old Shoe after a person is still, in many rural districts, believed to propitiate success, as in servants

seeking or entering upon situations or about to be married. But it may be questioned whether the old shoe has been thrown for luck only; and we are rather inclined to agree with Mr. Thrupp, in *Notes and Queries*, No. 182, that in Scripture "the receiving of a shoe was an evidence and symbol of asserting or accepting dominion or ownership; the giving back a shoe the symbol of rejecting or resigning it." The latter is evidenced in Deut. xxv., where the ceremony of a widow rejecting her husband's brother in marriage is by loosing his shoe from off his foot; and in Ruth we see that "it was the custom in Israel concerning changing that a man plucked off his shoe and delivered it to his neighbor." Hence Mr. Thrupp suggests that "the throwing a shoe after a bride was a symbol of renunciation of dominion and authority over her by her father or guardian: and the receipt of the shoe by the bridegroom, even if accidental, was an omen that the authority was transferred to him."

THE BRIDE'S VEIL

Originated in the Anglo-Saxon custom of performing the nuptial ceremony under a square piece of cloth, held at each corner by a tall man over the bridegroom and the bride to conceal her virgin blushes; but if the bride was a widow, the veil was dispensed with.

THE BRIDE-CAKE

Originated in *confarreation*, or a token of the most firm conjunction between man and wife, with a cake of wheat or barley, from *far* (Latin), bread or corn. Dr. Moffat tells us that "the English, when the bride comes from church, are wont to cast wheat upon her head." Herrick says, speaking to the bride:

> "While some repeat
> Your praise, and bless you, sprinkling you with wheat."

In Yorkshire the bride-cake is cut into little square pieces, thrown over the bride and bridegroom's head, then put through the ring nine times, and afterwards laid under pillows at night, to cause young persons to dream of their lovers.

ORANGE-BLOSSOMS WORN AT WEDDINGS.

The use of these flowers at bridals is said to have been derived from the Saracens, or at least from the East, and they are believed to have been thus employed as emblems of fecundity.

GRETNA-GREEN MARRIAGES.

In Scotland, nothing further has been necessary to constitute a man and woman husband and wife than a declaration of consent by the parties before witnesses, or even such a declaration in writing without any witnesses; a marriage which has been considered binding in all respects. Still, a marriage in Scotland not celebrated by a clergyman (with the exception of the notorious Gretna-Green marriages*), is rarely or never heard of; a result of the nearly universal feeling in favor of a religious celebration of the contract, and which would look upon the neglect of that solemnity as disreputable. The plain state of the case is—what the Scottish people have eschewed as evil, the more lax English have availed themselves of to ward off the rigor of their own law; and matches so made appear to have been almost exclusively "stolen" or "runaway," and the parties all English. The trade was established by a tobacconist, not a blacksmith as is generally believed; and the name of "Gretna Green" arose from his residence on a common or *green* between Graitnay and Springfield, to which latter village he removed in 1791. Gretna Green was the place chosen, as the nearest locality accessible to strangers actually within the territory of Scotland. In 1815, the number of marriages celebrated at Gretna, was stated, in Brewster's *Edinburgh Encyclopædia*, at sixty-five, which produced about 1000*l.*, at the rate of fifteen guineas each.

MORGANATIC MARRIAGE.

This signifies, among German princes, a union in which it is stipulated that, the wife being of inferior birth to her husband, neither she nor her children shall enjoy the privileges of his rank nor inherit his possessions. The marriage is, however, a good one, being strictly legal; and the children are legitimate. *Morganatic* is by some interpreted as akin to the Gothic *mourgjan*, to shorten or limit; an application of the word which would naturally rise out of the restrictions imposed on the wife and children of such a marriage. By others the term is referred to *morgengabe*, a free gift made by the husband after the first marriage-night. Or it is thought to mean left-handed, from the left hand being given in the ceremony instead of the right.

THE WEDDING-RING FINGER.

The origin of wearing the Wedding-ring upon the fourth finger of the left hand has been much disputed. Sir Thomas Browne appropriates

* And those performed at Lamberton Toll-bar, about three miles north of Berwick-upon-Tweed.

a chapter to this inquiry, observing: "An opinion there is, which magnifies the fourth finger of the left hand, presuming therein a cordial relation, that a particular vessel, nerve, vein, or artery, is conferred thereunto from the heart; and therefore, that especially hath the honor to bear our rings." Sir Thomas then refers to this practice as common not only in Christian but heathen-nuptial-contracts. He then observes, that it was not customary with the ancients to wear their rings either on the left hand or finger: thus, in Jeremiah it is said: "though Coniah, the son of Joachim, king of Judah, were the signet on my right hand, yet would I pluck thee thence." Pliny states that, in the portraits of the gods the rings were worn on the finger next the thumb; that the Romans wore them on the middle finger, as the ancient Gauls and Britons; and some upon the fore-finger, as is deducible from Julius Pollux, who names that ring Corionos. Since, therefore, the practice differs in various countries, we can scarcely refer it to any natural cause, which would alike affect all.

Sir Thomas next examines the anatomical details of nerve, vein and artery; adding that inspection does not "confirm a particular vessel in this finger," and that "these propagations being communicated unto both hands, we have no greater reason to wear our rings on the left than on the right."

The most reasonable inference as to the origin of wearing the ring on the left hand, however, appears to be a matter of convenience. Macrobius, a Latin author of the fifth century, says: "At first, it was both free and usual to wear rings on either hand; but after that luxury increased, when precious gems and rich insculptures were added, the custom of wearing them on the right hand was translated unto the left; for that hand being less employed, thereby they were best preserved. And for the same reason they placed them on this finger, for the thumb is too active a finger, and is too commonly employed with either of the rest; the index or fore-finger was too naked whereto to commit their pretiosities, and hath the tuition of the thumb scarce unto the second joint; the middle and little finger they rejected as extremes, and too big or too little for their rings; and of all chose out the fourth, as being least used of any, as being guarded on either side, and having in most this peculiar condition, that it cannot be extended alone and by itself, but will be accompanied by some finger on either side." The reason commonly assigned for wearing the ring is, however, somewhat in accordance with the theory referred to by Sir Thomas Browne, that as the larger portion of the heart is on the left side, the left hand is nearest the heart.

The Greek church directs that the ring be put on the right hand, and, although the direction of the Sarum *Manual* is by no means clear, such may have formerly been the practice in England, for Rastell in his counter-challenge to Bishop Jewel, notes it as a novelty of the Reformation. "That the man should put the wedding ring on the fourth finger of the left hand of the woman, and not on the right hand, as hath been many hundreds of years continued." But the practice of the Roman church agrees with the English at present.

LUCK OF HORSE-SHOES.

Butler, in *Hudibras*, says of his conjuror, that he could

> "Chase evil spirits away by dint
> Of sickle, *horse-shoe*, hollow flint."

Aubrey in his *Miscellanies*, tells us that

"It is a thing very common to nail horse-shoes on the thresholds of doors; which is to hinder the power of witches that enter the house. Most of the houses of the west-end of London have the horse-shoe on the threshold. It should be a horse-shoe that one finds." He adds, "Under the porch of Stanfield Church, in Suffolk, I saw a tile, with a horse-shoe upon it, placed there for this purpose, that one would imagine that holy water alone would have been sufficient. I am told there are many more instances."

In Gay's fable of "The Old Woman and her cats," the supposed witch complains:

> "Straws laid across my path retard,
> *The horse-shoe's nail'd, each threshold's guard.*"

In Monmouth Street, probably one of the localities alluded to by Aubrey (then a fashionable neighborhood), many horse-shoes nailed to the thresholds, were to be seen in 1797; in 1813, Sir Henry Ellis counted seventeen horse-shoes in Monmouth Street; in 1852, only eleven remained.

It was once thought lucky to find old iron, but more especially a horse-shoe. This notion has been current in our time, as well as the nailing of the shoes in front of the sill and *over* the doorway, in Sussex; where, in childhood, we have more than once accounted ourselves lucky in finding a horse-shoe.

Nelson was of a superstitious turn, had great faith in the luck of a horse-shoe, and one was nailed to the mast of the ship *Victory*. "Lucky Dr. James" attributed the success of his fever-powder to his finding a horse-shoe.

IS FRIDAY AN UNLUCKY DAY?

A journal answers this question in the following satisfactory manner: "On Friday, August 21, 1492, Christopher Columbus sailed on his great voyage of discovery. On Friday, October 12, 1492, he first discovered land. On Friday, January 4, 1493, he sailed on his return to Spain, which, if he had not reached in safety, the happy result would never have been known which led to the settlement on this vast continent. On Friday, March 15, 1493, he arrived at Palos in safety. On Friday, November 22, 1493, he arrived at Hispaniola, on his second voyage to America. On Friday, June 13, 1494, he, though unknown to himself, discovered the continent of America. On Friday, March 5, 1496, Henry VIII. of England gave to John Cabot his commission, which led to the discovery of North America. This is the first American state-paper in England. On Friday, September 7, 1565, Melendez founded St. Augustine, the oldest town in the United States by more than forty years. On Friday, November 10, 1620, the May-flower, with the Pilgrims, made the harbor of Provincetown; and on the same day they signed that august compact, the forerunner of our present glorious constitution. On Friday, December 22, 1620, the Pilgrims made their final landing at Plymouth Rock. On Friday, February 22, George Washington, the father of American freedom, was born. On Friday, June 16, Bunker Hill was seized and fortified. On Friday, October 7, 1777, the surrender of Saratoga was made, which had such power and influence in inducing France to declare for our cause. On Friday, Sept. 22, 1780, the treason of Arnold was laid bare, which saved us from destruction. On Friday, October 19, 1781, the surrender at Yorktown, the crowning glory of the American arms, occurred. On Friday, July 7, 1776, the motion in Congress was made by John Adams, seconded by Richard Henry Lee, that the United States colonies were, and of right ought to be, free and independent. Thus, by numerous examples, we see that, however it may be with foreign nations, Americans need never dread to begin on Friday any undertaking, however momentous it may be."

STYLE OF LOUIS QUATORZE.

A style of ornament is now fostered to a great extent, and is erroneously termed that of Louis XIV., but which, in fact, is the debased manner of the reign of his successor, in which grotesque varieties are substituted for classic design. It is, in truth, what the French call the style of Louis XV. The best style of Louis XIV., is the Roman and Italian styles made more sumptuous; but the moment that the gro-

tesque scroll, so common in the reign of Louis XV., was introduced, it interrupted the chasteness of the Roman style.

SYMBOLS OF THE FOUR EVANGELISTS.

Horne in his *Introduction*, vol. iv. p. 254, says that Irenæus was the first to discover the analogy between the four animals mentioned by Ezekiel (i. 5, 10), and the four Evangelists, which gave rise to the well-known paintings of these latter. He quotes from *Iren. Adv. Hær.* lib. iii. cap. 2, "The first living creature, which is like a lion, signifies Christ's efficacy, principality, and royalty, viz. John; the second, like a calf, describes his sacerdotal order, viz. Luke: the third, having as it were a man's face, describes his coming in the flesh as man, viz. Matthew; and the fourth, like a flying eagle, manifests the grace of the Spirit flying into the Church, viz. Mark."

THE MISTLETOE AT CHRISTMAS.

The name of this plant is derived by Johnson from *mysteltan*, Saxon; *mistel*, Danish, birdlime; and *tan*, a twig. It is a parasitic plant, found wild in England, very rarely in Scotland, and nowhere in Ireland. The seeds in germination offer an exception to a general law, that the radicle of the embryo shoots downwards, and the plumula upwards. Thus, if a cannon-ball, to which mistletoe-seeds are glued on all sides, be suspended by a cord some distance from the earth, both the upper and under seeds, as well as those at the sides, all direct their radicle to the surface of the ball. This property insures their growing upon the branches of trees, to whatever side they happen to stick. Dutrochet ascribes this peculiarity to the tendency of the radicle of mistletoe to avoid light: he attached seeds to the inside of a square of glass in a window, when the radicles were all directed to the interior of the apartment; he then glued others upon the outside of the squares, and they turned their radicles down upon the glass, thus directing themselves towards the dark interior.

"Misseltoe groweth chiefly upon crab-trees, apple-trees, sometimes upon hazles, and rarely upon oaks; the misseltoe whereof is counted very medicinal; it is ever green, winter and summer, and beareth a white glistening berry; and it is a plant utterly different from the plant upon which it groweth."—*Bacon.*

The fruit which is covered with a viscid pulp, is made by the Italians, and even in Herefordshire, into a kind of birdlime. Mistletoe grows luxuriantly upon the apple or pear tribe of trees; and Mr. Jes-

sie describes it as flourishing upon some lime-trees in Datchet Mead, just as Shakspeare described it in his day.

The mystic uses of the mistletoe are traced to the pagan ages: it has been identified with the golden branch referred to by Virgil, *in infernis;* and it is affirmed to have been used in the religious ceremonies of the Greeks and Romans. Sir James E. Smith thus points out the distinction of the mistletoe of the ancients from our own:

Loranthus Europæus seems to be the original or most common mistletoe of the Greeks, which grows usually on some kind of fir-tree. But our *viscum album* is likewise found in Greece, though rarely growing on the oak; and this has been preferred from the most remote antiquity. Hence, when the supertitions of the east travelled westward, our Druids adopted a notion of the mistletoe of the oak being more holy or efficacious, in conjurations or medicine, than what any other tree afforded; the *Loranthus*, or ordinary mistletoe, not being known there. This superstition actually remains; and a plant of viscum gathered from oak, is preferred by those who rely on virtues which perhaps never existed in any mistletoe whatever."

The Druids and Celtic nations called it *all-heal* and *guidhel*. They had an extraordinary veneration for the number *three*, says Vallancey, and they chose the mistletoe, because not only its berries, but its leaves also, grow in clusters of three united to one stalk; but the leaves grow in pairs only. The Druids celebrated a grand festival on the annual cutting of the mistletoe, which was held on the sixth day of the moon nearest their new year.

In the Scandinavian mythology, the mistletoe is dedicated to its Venus, Friga; and previous to the introduction of Christianity, the feast of Thor was celebrated by the Northmen at nearly the same period,—a fact which accounts for the bacchanalian character of the Christian feast.

Kissing a fair one under the mistletoe, and wishing her a happy new year as you present her with one of the berries for luck, is the Christmas custom of our times; and in some places persons try lots for the bough with most berries by the crackling of leaves and berries in the fire.

But at what period came mistletoe to be recognized as a Christmas evergreen? We have Christmas carols in praise of holly and ivy of even earlier date than the fifteenth century; but allusion to mistletoe can scarcely be found for two centuries later, or before the time of Herrick.

Shakspeare describes:

> "The trees, though summer, yet forlorn and lean,
> O'ercome with moss and baleful mistletoe."

Coles, in his *Knowledge of Plants*, 1656, says of mistletoe: "it is carryed many miles to set up in houses about Christmas time, when it is adorned with a white glistening berry."

Gay, in his *Trivia*, thus refers to the decking of churches:

> "Now with bright holly all the temples strow,
> With laurel green and sacred mistletoe."

Mr. Brand, however, thinks that mistletoe was never *put up in churches*, among evergreens, "but by mistake or ignorance of the sextons; for it was the heathenish or profane plant, as having been of such distinction in the pagan rites of Druidism, and it therefore had its place assigned it in kitchens, where it was hung in great state with its white berries."

DOMESTIC HABITS OF OUR ANCESTORS.

It was a characteristic of the sort of civilization which the Anglo-Saxons brought with them to England, that they introduced the custom of taking four meals a day. At Saxon tables, both sexes sat together; and table-cloths were used. The meat was never "dished," and "covers" were as yet unknown. The attendants brought the viands into the dining-hall on the spit, knelt to each guest, presented the spit to his consideration; and, the guest having helped himself, the attendant went through the same ceremony with the next guest. Hard drinking followed upon these same ceremonies; and even the monasteries were not exempt from the sins of gluttony and drunkenness. Notwithstanding these bad habits, the Anglo-Saxons were a cleanly people. The warm bath was in general use. Water for hands and feet, was brought to every stranger on entering a house wherein he was about to tarry and feed, and it is said that one of the severest penances of the Church was the temporary denial of the bath, and of cutting the hair and nails.

With the Normans came greater grandeur and increased discomfort. They neither knew nor tolerated the use of table-cloths or plain steel forks; but their bill of fare showed more variety and costliness than the Saxons cared for. Their beverage was of a very bilious character, spicy and cordialed, namely, hippocras, piment, morat, and mead. The drink of the humbler classes partook of a more choleric quality. It consisted of cider, perry, and ale. In the two following

centuries, cooks and kings launched into far greater magnificence than had ever hitherto been seen in England. Richard II. entertained ten thousand guests daily at his numerous tables; and the Earl of Leicester, grandson of Henry III., is said to have spent twenty-two thousand pounds of silver in one year, in eating, alone. His household retainers drank no less than three hundred and seventy-one pipes of wine, in the same space of time.

The household-book of the Earl of Northumberland admirably illustrates the interior and table-life of the greater nobles of the period of Henry VII. In this record, the family is described as consisting of one hundred and sixty-six persons, masters and servants; and hospitable reckoning is allowed for more than half a hundred strangers, who are expected daily to partake of the Earl's good cheer. The cost for each individual, for board and fuel, is settled at two pence halfpenny daily, about one and sixpence of our present money, if we take into account the relative value of money and the relative prices of provisions. The Earl allots for his annual expenditure, £1178 17s. 8d. More than two-thirds of this is consumed in meat, drink, and firing, namely, £797 11s. 2d. An absent servant, if he be on "my lord's" business, received 8d. per day, board wages, in winter, and 5d. in summer, with 2d. additional daily for the keep of a horse. A little more than a quarter of wheat, estimated at 5s. 8d. per quarter, is allowed for every month throughout the year; with this, 250 quarters of malt, at 4s., (two hogsheads to the quarter,) and producing about a bottle and a third of intermediate beer to each person, does not say much for the liberality of the Lord, though it may for the temperance of his retainers. One hundred and nine fat beeves are to be bought at All-Hallows' Tide, at 13s. 4d. each; a couple of dozen of lean kine, at 8s. are to be bought at St. Helen's, to be fattened for service between Midsummer and Michaelmas. All the rest of the year, nine weary months, the family was on salted provisions, to aid the digestion of which, the Earl, so chary of his liquor, allows the profuse aid of one hundred and sixty-six gallons of mustard. 647 sheep, at 1s. 8d., to be eaten, salted between Lammas and Michaelmas; 25 hogs, at 2s., 28 calves, at 1s. 8d., 40 lambs, at 10d. or 1s., are other articles which seem to have been reserved rather for the upper table than for the servants, whose chief fare was salted beef, without vegetables. There was great scarcity of linen. "My Lord's" table had eight "table-cloths" for the year, that of the Knights had but one. If the ale was limited, the wine appears to have been more liberally dispensed; and ten tuns and two hogsheads of Gascony wine, at £4 13s. 4d. per tun, show the

bent of the Earl's taste. Ninety-one dozens of candles for the year, and no fires after Lady Day, except half-fires in the great room and the nursery; twenty-four fires, with a peck of coals daily for each, (for the offices,) and eighty chaldrons of coals, at 4s. 10d., with sixty-four loads of wood, at 1s. a load, are the provisions made for lighting and firing. The family rose at six or before, for Mass was ordered at that hour. The dinner-hour was 10 A. M.; 4 P. M. was the hour for supper, and at 9 the bell rang for bed. The breakfast took place at 7, after mass; when my Lord and Lady sat down to a repast of two pieces of salt fish and half a dozen red herrings, with four fresh ones, or a dish of sprats, and a quart of beer and the same measure of wine. This was on meagre days. At other seasons, half a chine of mutton, or of boiled beef, graced the board. Capons, at 2d. each, were only on the Lord's table, and plovers, at a penny, (at Christmas,) were deemed too good for any digestion that was not carried on in a "noble" stomach. My Lord maintained between twenty and thirty horses for his own use. His mounted servants found their own; but their keep was at the master's cost. Of mounted servants, not less than three dozen attended their Lord on a journey; and, when this journey was for a change of residence from one mansion to another, the illustrious Percy carried with him bed and bedding, household furniture, pots, pans, and kitchen utensils generally. On the journey, he had two hundred and twenty-three retainers, including eleven priests.—DR. DORAN'S *Table Traits.*

SAXON AND NORMAN NAMES OF PROVISIONS.

The names of provisions throw some light upon the mode of living among the higher and lower classes of our population. Bread, with the common productions of the garden, such as pease, beans, eggs, and some other articles which might be produced in the cottage-garden or yard, retain their Saxon names, and evidently formed the chief nourishment of the Saxon portion of the population. Of meat, though the word is Saxon, they ate probably little; for it is one of the most curious circumstances connected with the English language, that while the living animals are called by Anglo-Saxon names, as oxen, calves, sheep, pigs, deer, the flesh of those animals when prepared for the table is called by names which are all Anglo-Norman—beef, veal, mutton, pork, venison. The butcher who killed them is himself known by an Anglo-Norman name. Even fowls when killed receive the Norman name of poultry. This can only be explained by the circumstance that the Saxon population in general was only acquainted with the

living animals, while their flesh was carried off to the castle and table of the Norman possessors of the land, who gave it names taken from their own language. Almost the only meat obtained by the peasantry was bacon, and that also is still called by an Anglo-Norman name.—*Gentleman's Magazine.*

OLD ENGLISH MANSIONS.

It is an error to suppose, that the English gentry, (in the Middle Ages,) were lodged in stately or even in well-sized houses. Generally speaking, their dwellings were almost as inferior to those of their descendants in capacity as they were in convenience. The usual arrangement consisted of an entrance-passage running through the house, with a hall on one side, a parlor beyond, and one or two chambers above; and on the opposite side, a kitchen, pantry, and other offices. Such was the ordinary manor-house of the fifteenth and sixteenth centuries, as appears not only from the documents and engravings, but, as to the latter period, from the buildings themselves, sometimes, though not very frequently, occupied by families of consideration, more often converted into farm-houses, or distinct tenements. Haddon-Hall and Penshurst still display this ancient arrangement. Larger structures were erected by men of great estates during the reigns of Henry VI. and Edward IV.; but very few can be traced higher; and such has been the effect of time, still more through the advance or decline of families, and the progress of architectural improvement, than the natural decay of these buildings, that it is conceived difficult to name a house in England, still inhabited by a gentleman, and not belonging to the order of castles, the principal apartments of which are older than the reign of Henry VII. The instances, at least, must be extremely few. Single rooms, windows, doorways, &c. of an earlier date, may perhaps not unfrequently be found.—HALLAM.

LAW OF PEWS.

The right to a pew in church by the common law is merely a right to occupy it during divine service. In England the freehold of the church is in the parson for the time being. In the United States, this title generally depends on statutes enacted by the several States to regulate this description of property. In some of them, pews are expressly declared to be personal estate, in others real estate. The right of the pew-holder is subject to that of the proprietors or trustees, or parish, in whomsoever the general title is vested, to repair, alter, remove, abandon, or rebuild the edifice, for the purpose of more con-

venient worship, and when it is necessary for that purpose. But if such alteration is not necessary, but is made solely for reasons of pleasure or expediency, the pew-holder is entitled to be indemnified for the loss of his pew. And while the house remains, the pew-holder may maintain an action if he be disturbed in his right. But he cannot dig a vault under it or erect any thing over it without the consent of the owners or trustees of the church. Nor has the pew-holder any claim that the relative situations of the internal position of the church shall not be altered.—GREENLEAF'S *Cruise on Real Property.*

LAW OF BURIAL.

Neither a corpse nor its burial is legally subject, in any way, to ecclesiastical cognizance, nor to sacerdotal power of any kind. The right to bury a corpse and preserve its remains is a legal right which the courts of law will recognize and protect; and such right, in the absence of any testamentary disposition, belongs exclusively to the next of kin. The right to protect the remains includes the right to preserve them by separate burial, to select the place of sepulture and to change it at pleasure. If the place of burial be taken for public use, the next of kin may claim to be indemnified for the expense of removing and suitably re-interring the remains.

THE LAW OF SLOPES.

In France, the high roads must not exceed 4° 46′ by law; in England 4°, or one foot rise in thirty-five. A slope of 15° is extremely steep, and one down which one cannot descend in a carriage. A slope of 37° is almost inaccessible on foot, if the bottom be a naked rock or a turf too thick to form steps. The body falls backwards when the tibia makes a smaller angle than 43° with the sole of the foot—42° being the steepest slope that can be climbed on foot in a ground that is sandy. When the slope is 44°, it is almost impossible to scale it, though the ground permits the forming of steps by thrusting in the feet. A slope of 55° is quite inaccessible to man.

ORIGIN OF LYNCH LAW.

Lynch Law takes its name from the stern and summary act of one James Lynch Fitz-Stephen, a merchant of the Irish town of Galway, and, in 1526, its mayor or warden. The son of this Lynch Fitz-Stephen, having committed a foul murder, his father, exercising his authority as warden, had him arrested and brought for trial before himself.

The father, on conviction, Brutus-like, sentenced his son to death, and fearing a rescue from the prison, caused him to be brought home and to be hanged before his own door.

The American system of Lynch Law began in what is now known as the Piedmont country of Virginia, which was at the time the western frontier, and having no law of its own, and being seven miles from the nearest court of criminal jurisdiction, controversies were constantly referred to men of sound judgment and impartiality in the district, whose decisions were regarded as final. Prominent among these was a man whose awards exhibited so much justice, judgment, and impartiality, that he was known throughout the country as Judge Lynch. In the course of time criminals were brought before him, and he awarded such punishment as he considered just and proper. There were other persons, in different districts, who acted as arbitrators, and who awarded punishments; but Judge Lynch was the most conspicuous, and consequently the system took his name, and was called Lynch Law. This was a compliment to his integrity and high character. But of late years the term has been regarded as a reproach, because violent and unprincipled men, such men as Lynch was wont to punish, have set the laws at defiance, and while inflamed with passion, or maddened by a thirst for revenge, have usurped the prerogatives of the courts of justice.

NISI PRIUS.

This term, generally, though not with legal strictness, is applied to all actions of a civil nature in the superior courts; the word "Nisi Prius" Court at the assizes is understood to designate that court where the civil actions are tried. A trial at Nisi Prius really means the trial of a cause which has arisen in one of the superior courts of Westminster, and which has been sent for a decision on the facts before a jury and one of the judges (or now a judge alone) of such courts, to be heard elsewhere than in the full sitting or sitting at bar, as it is called, of the court. The superior court meanwhile reserves to itself the judgment and ulterior proceedings. The word "Nisi Prius" arose from an expression in the old writ of Venire Facias, which directed the sheriff of the county where the action arose to summon jurors to come on a day named from such county to Westminster to try the action there, "Nisi Prius" (so said the Latin writ) "*unless before* that day" the judges of assize came into his (the sheriff's) county, and then he was to summon the jurors before such judges of assize. Now these judges were sure to come into the county to hold

the assizes before the day named, and thus were the litigants and their jurors relieved from the trouble and expense of going to Westminster to have the actual matters of fact tried there. The Jury summons has been altered, but the name of Nisi Prius continues to designate the same kind of trial to this day. The action, and the law and judgment upon it, remain still with the courts at Westminster; while, for convenience, the trial of the facts is deputed elsewhere, viz., to what has become a fixed, understood term, "Nisi Prius." Criminal proceedings have mostly their origin, trial, and judgment in the county where the offence or arrest occurs; but sometimes when the indictment is found in the Court of Queen's Bench, it is sent for trial to the assizes, and it is then said to be tried at Nisi Prius. After trial, the offender, if convicted, is brought to Westminster to be sentenced.

The practice of judges going upon circuits seems to date from a very remote period, for we find in 1st Samuel, c. vii., v. 16, these words: "And he (Samuel) went from year to year in circuit to Bethel, and Gilgal, and Mizpeh, and judged Israel in all those places." Indeed the practice was one of so great convenience, that its introduction was very natural. An intolerable burden would have been thrown upon suitors if they had been required in every case to come up to the place where the king's court held its sittings to procure justice. Consequently, in England the remedy was devised, or perhaps adopted, from the Jews, of sending into different parts of the country persons commissioned to try sometimes all, sometimes certain classes of the cases arising in those parts and then ready for hearing. These were known as *Justices in Eyre* (*i. e.* itinere), or, as they were called, from one of the most important classes of cases which they were usually commissioned to try, those relating to the possession of land, Judges of Assize,—assize being the name of the jury whom, by the writ commencing this species of trial, the sheriff was ordered to summon, for the purpose of ascertaining by their verdict the person *primâ facie* entitled to be tenant of the soil. Justices in Eyre are mentioned as early as 1170; but the division of the kingdom into six districts or circuits (a little different, but not much, from the present), and the appointment of three justices to each, dates from 1176. To these Justices in Eyre have succeeded the modern Justices of Assize. Wales also at present forms two additional circuits, which proceed to and unite themselves into one at Chester.

THE CODE NAPOLEON.

When Napoleon I. was forming the Code Napoleon, he astonished the Council of State by the readiness with which he illustrated any

point in discussion by quoting whole passages, extempore, from the Roman civil law; a subject thought entirely foreign to him, as his whole life had been passed in the camp. On being asked by Treilhard how he had acquired so familiar a knowledge of law, he replied: "When I was a lieutenant, I was once unjustly put under arrest. The small room assigned for my prison contained no furniture but an old chair and a cupboard; in the latter was a ponderous volume, which proved to be a digest of the Roman law. As I had neither paper, pens, ink, nor pencil, you may easily imagine this book to have been a valuable prize to me. It was so bulky, and the leaves were so covered by marginal notes in manuscript, that had I been confined a hundred years, I need never have been idle. I was only ten days deprived of my liberty; but on recovering it, I was saturated with Justinian and the decisions of the Roman legislators. It was thus I acquired my knowledge of the civil law."

AGRARIAN LAW.

The term *agrarian* signifies "relating to land," and the agrarian laws of Rome were substantially a question similar to that of the Crown lands in the British colonies. The rich became squatters upon them, and obtained a possessory title. An Agrarian Law, or the sending out of a colony, was a measure for dividing the public land among the poorer citizens without payment.—*Edinburgh Review.*

WHAT IS A COUSIN?

In a case in Chancery where a testator had left his property to *his cousins*, the Vice-Chancellor (Stuart) held that this included first cousins once removed, as also second cousins. The Lord Chancellor (26th Nov. 1855) reversed this decision, and held that first cousins were alone entitled to the benefit of the will. The counsel, for the more extended meaning of the word, cited the following authorities:

"This kyng was enticed so, that he now atte laste
Ys eet and up hys *cosyn* bigan too werre faste."

R. Gloucester, p. 88.

"Oon of the bisschopis servauntis, *cosyn* of him whoose sare Petir kitte of, seide, Sigh I thee not in the gherd with him?"—*Wicliff*, John c. 18.

"For I myself desiride to be departed fro Christ for my britheren that ben my *cosyns* after the fleisch, that ben men of Israel."—*Id.* Romaynes, c. 9.

"Ede Plato sayeth, who so can him rede
The wordes, most ben *cosin* to the dede."

Chaucer, Prologue, v. 719.

"And for as muckle as this goode man
And eke this monk, of which that I began,

> Were both two yborne in a village,
> The monk him claimeth as for *cosinage*."
>
> *Id.* Shipmanne's Tale, v. 12.

The word "cousin" occurs about two hundred times in Shakspeare, and generally in a sense different from that of first cousin.

WHO ARE ESQUIRES?

The present use of the distinction "Esquire" conveys not the remotest idea of its origin, or appropriation in past ages. The esquire originated in chivalric times, when the sons of gentlemen, from the age of seven years, were brought up in the castles of superior lords; which was an inestimable advantage to the poorer nobility, who could hardly otherwise have given their children the accomplishments of their station. From seven to fourteen, these boys were called pages, or varlets; at fourteen, they bore the name of esquire. They were instructed in the management of arms, in the art of horsemanship, in exercises of strength and activity, so as to fit them for the tournament and the battle, and the milder glories of chivalrous gallantry. Long after the decline of chivalry, the word esquire was only used in a limited sense for the sons of peers and knights, or such as obtained the title by creation or some other legal means. Blackstone defines esquires to be all who bear office or trust under the crown, and who are styled esquires by the king in their commissions and appointments; and being once honored by the king with the title of esquire, they have a right to that distinction for life. These distinctions are now almost totally disregarded, and all gentlemen are generally termed esquires both in correspondence and in deeds; except solicitors and attorneys, who, in course of business, are called gentlemen.

ESSOIGN-DAYS, AND DAYS OF GRACE.

In the reign of Henry II., the day first mentioned in each term was called Essoign-day, because the court then took the essoigns, or excuses, of those who did not appear according to the summons of the writs; but as—by a custom, traced by Blackstone to the Germans of the age of Tacitus (*Com.* iii. 278)—three days of grace were allowed to every defendant within which to appear, the court did not sit for the despatch of business until the fourth day after that time. On the other hand, they continued to sit till the fourth day *after* the last return. Thus, *e. g.*, Hilary Term was not considered to begin till the 23d of January, nor to end till the 12th of February.

TENDER IN PAYMENT.

A Tender in Payment is rarely made in a legal manner. People commonly clog it with some condition, which makes it no tender in law. One man goes to another, and says, "Here is your money; but I must have a receipt in full of all demands." A tender, to be good, must be an unconditional one, clogged with no stipulation whatever. —*Baron Maule.*

ATTAINMENT OF MAJORITY—COMING OF AGE.

Professor de Morgan, in the *Companion to the Almanac*, 1850, says:

"A person who is born on the 10th of June, in our day, counts a year as completed so often as a 10th of June arrives. He says, 'I shall not be of age until the 10th of June;' ask him how old he is on the 9th, and he will say, 'I shall not be of age till to-morrow.' If he were born at noon, it is true that he does not complete twenty-one years of days divisible into fractions until the noon of the 10th. Nevertheless, in the law, which here preserves the old reckoning, he is of full age on the *ninth;* though he were born a minute before midnight on the 10th, he is of age to execute a settlement or to vote at a minute after midnight on the morning of the 9th, forty-eight hours all but two minutes before he has drawn breath for the space of twenty-one years. The law reasons thus:—there are no parts of days; he who is born on the 10th, takes the whole of the 10th as part of his life; he is a year old when he has completed 365 days; the 9th of next year is his 365th day; as soon as he has commenced the 9th, he has passed through the whole of it, for the day has no parts; therefore he has lived a complete year, or is one year old as soon as the 9th arrives. And the conclusion is unavoidable so soon as it is granted that a day has no parts. The anniversary of the birth used to be celebrated as the first day of a new year; it is now considered as the completion of the old one."

We have the following good authority for Professor de Morgan's statement:

"The full age in male or female is twenty-one years, which age is completed on the day preceding the anniversary of a person's birth, who till that time is an infant, and so styled in law."—*Blackstone's Commentaries*, vol. i. p. 463.

That the law rejects fractions of a day is clear. In the case of Reg. *v.* the parish of St. Mary, Warwick, reported in the *Jurist* (vol. xvii. p. 551), Lord Campbell said:

"In some cases the court does not regard the fraction of a day. Where the question is, on what day a person came of age, the fraction of the day on which he was born, and on which he came of age, is not considered. . . . It is a general maxim, that the law does not regard the fraction of a day."

SERGEANT-AT-LAW; HIS COIF AND RINGS.

Sergeant-at-Law, in Latin, *Serviens ad legem*, is in Great Britain the highest degree of the Common Law, and is equivalent to that of Doctor in the Civil Law. The Sergeantcy-at-Law, moreover, is somewhat of a title or dignity as well as a degree, being created by the Queen's writ, and the Sergeant's coif is said to be *signum status et gradus*. The Sergeants-at-Law form a brotherhood to which the judges of the Common-Law Courts at Westminster must belong. So strict is the rule, that if a lawyer be raised to the bench of those courts, and be not then a sergeant, he is forthwith made one prior to being constituted a judge. For this reason, as belonging to the same body, the Judges of the Common-Law Courts at Westminster invariably address a sergeant as "Brother;" and they never apply the term to any other counsel. The Sergeants are a body incorporated by Act of Parliament, and not an Inn of Court. The dress of the Sergeant (his robes varying in color on particular days) has much of an ecclesiastical character, no doubt from this fact: the original Sergeants-at-Law were certain obstinate clerical lawyers, who tempted, doubtless, by the fees, would persist in remaining as advocates in the secular courts after they were prohibited by canon. To hide the tonsure which did not suit their renegade position, they covered it with a piece of linen called "the Coif;" hence the term which designates their degree. The modern Sergeant, however, leaves the place of tonsure visible by means of a circular black patch on the top of his wig. By that mark, peculiar to his order, the Sergeant-at-Law may always be recognized in court.

The *process* of giving a Sergeant's ring is this: After the writ is issued from the Petit Bag Office, calling upon him to take upon himself the degree of the coif under the penalty of 1000*l.*, he receives a notice from the Lord Chancellor to appear before him and be sworn in. At the time and place appointed he does appear, attended by a barrister, commonly called his *colt*. He takes the oaths of allegiance, supremacy, &c. This over, the colt advances and "begs to present to the Lord Chancellor a gold ring for her Majesty." He also begs to be allowed to present another to the Lord Chancellor. Both are gra-

ciously accepted. Her Majesty's is worth 10*l.* The make of these rings is very antique, and they bear an appropriate motto chosen by the Sergeant.

The mottoes are many of them quite curious, and they occasionally have a tinge of humor about them. Thus it is but a few years since one of the mottoes given was, "*Hic per tot casus.*" The *meaning* of this ring-giving is a mystery—is lost in antiquity.

SPECIAL PLEADERS.

The word "Pleading" at the English bar does not mean the speaking of an advocate, but technically designates the drawing out of such written statements and counterstatements in a cause as are necessary to show what is the actual question in dispute that is to form the subject of the trial. An English lawyer will seldom or never use the word pleading in any other sense. So far from pleading referring to speaking, there is a certain class of professional gentlemen who have no audience in a public court of justice. These are the "Special Pleaders," who have not been called to the bar, but who, after keeping the full terms necessary for being so called, and on paying a certain amount of stamp-duty, are permitted to practise in the way of "pleading," that is, in making the statements and counterstatements above mentioned, as well as advising on the evidence necessary to sustain a case, and drawing out affidavits and many other legal writings requiring to be done with great knowledge and care. A special pleader of this description must, of course, to succeed, be a person profoundly versed in the learning of the law, and quite a master of his art. He usually takes pupils, who attain their preparation for the bar from aiding him in the drawing and study connected with the subjects that come before him. After some years of this practice, a special pleader goes himself to the bar, and generally reaches the bench; for most of the puisne judges have been "special pleaders." It should, however, be understood, that an actual barrister may, and often does, practise as a "special pleader;" but his absence in court and on circuit rather interferes with the continual application that "pleading" requires. From the recent reform and greater facility of legal process, the class of special pleaders not at the bar is now far less numerous than it used to be. The establishment of the body of Special Pleaders dates from about the beginning of the last century. Before then students for the Bar went as pupils to solicitors.

ORIGIN OF SOLICITORS.

This branch of legal practitioners seems to have arisen in great part out of the suits in the Star-Chamber. "In our age," says Hudson, a barrister of Gray's Inn in the reign of Charles I., "here are stepped up a new sort of people called Solicitors, unknown to the records of the law, who, like the grasshoppers in Egypt, devour the whole land; and these, I dare say (being authorized by the opinion of the most reverend and learned Lord Chancellor that ever was before him), were express maintainers, and could not justify their maintenance upon any action brought; I mean not where a lord or gentleman employed a servant to solicit his cause,—for he may justify his doing thereof; but I mean those which are common solicitors of causes, and set up a new profession, not being allowed in any court, or at least not in the court where they follow causes; and these are the retainers of causes, and devourers of men's estates by contention, and prolonging suits to make them without end."

The erroneous impression that the name of "Solicitor" is a more honorable designation than that of "Attorney," has been thus corrected by Mr. Samuel Warren, in his *Lectures*. The late Lord Tenterden took some trouble several times in refuting such a notion, and stigmatized as absurd the conduct of those who called by the name of *solicitors* persons conducting the proceedings in courts of *law*. The proper expressions are "Attorney-at-law" and "Solicitor-in-equity." There is no difference whatever between the two in respect of rank or *status*,—any more than there is between barristers practising respectively in courts of law and equity. If there be any preference, I should have thought it would lead to the good old Saxon word *attorney*—indicating an office most honorable and ancient. The word "solicitor" is, comparatively speaking, of much more recent introduction—an offshoot from the under-clerks of the now abolished Six Clerks in the Court of Chancery. . . . . . At all events, never use the word "solicitor" either in writing, or verbally, with reference to proceedings *at law;* or you will justly incur the censure expressed by Lord Tenterden.

These observations are not applicable to Scotland, were there is no such class of practitioners as attorneys. There "lawyer" or "solicitor" answers to our "attorney-at-law." The office of "attorney" in Scotland is merely private, and conferred by letter of attorney, regulating the nature and extent of the business therein delegated.

Attorneys are said to be "Gentlemen by Act of Parliament." Why so is, however, not clear; for among the various acts relative

to attorneys no such enactment is to be found. The idea may possibly have arisen from the term "general attorney," or *attornatum genâlem*, as expressed in a very early statute, the words having possibly been converted into "Gentleman Attorney."

PRESENTATION TO LIVINGS.

Much error prevails as to the right of purchasing Presentations to livings. The right of presenting may be purchased, but the exercise of the right for money is simoniacal. Hence, during a vacancy, the presentation cannot be sold; neither is it legal to buy the right of presenting a particular person. The right, whether of perpetual presentation, or of single presentation, must be conveyed absolutely and unconditionally, if conveyed at all.—*Bishop of Llandaff's Charge.*

WOOLSACKS IN THE HOUSE OF LORDS.

When, in the reign of Elizabeth, an act of parliament was passed to prevent the exportation of wool, to keep in mind this source of our national wealth, woolsacks were placed in the House of Lords, whereon the Judges sit. Hence the Lord Chancellor who presides in the House of Lords is spoken of as appointed to the woolsack, attaining the woolsack, &c.

HANGMAN'S WAGES.

The sum of thirteenpence-halfpenny has no reference to the payment to the hangman, as is shown in the notes to Butler's *Hudibras:*

"I cannot really say whence that sum (thirteenpence-halfpenny) was called "Hangman's Wages," unless in allusion to the *Halifax Law*, or the customary Law of the Forest of Hardwick, by which every felon taken within the liberty or precincts of the said forest with goods stolen to the value of thirteenpence-halfpenny, should, after three market-days in the town of Halifax after his apprehension and condemnation, be taken to a gibbet there, and have his head cut off from his body."

The following document tends to rectify this old error, that it costs only thirteenpence-halfpenny to be hung. It is copied verbatim from a bill made out by the executioner, when Sir John Silvester was recorder of London:

Silvester.	s.	d.
Executioner's fees	7	6
Stripping the body	4	6
Use of shell	2	6
1818. Nov. 10.	14	6

THE DEODAND.

By Deodand (*Deo dandum*, given to God) is understood whatever personal chattel occasions the death of a man without the default of another, and also the instrument with which the murder is committed. In England deodands (now abolished by statute) were forfeited to the king, to be applied to pious uses and distributed in alms by his high almoner; but the crown most frequently granted the right to deodands, within certain limits, to individuals for an estate of inheritance to be annexed to lands, in virtue of which grants they were claimed. The custom was also part of the Mosaic law (Exodus xxi. 28). In modern times, juries have mitigated the forfeitures, and a given amount is commonly awarded as a deodand less than the value of the chattel. Johnson defines this term from Cowell as follows:

Deo dandum (Lat.). A thing given or forfeited to God for the pacifying his wrath, in case of any misfortune, by which any Christian comes to a violent end, without the fault of any reasonable creature; as if a horse should strike his keeper, and so kill him; in this case the horse is to be given to God, that is, sold and distributed to the poor, for an expiation of this dreadful event, though occasioned by unreasonable, senseless, and dead creatures: and though this be given to God, yet is it forfeited to the king by law, as executor in this case, to see the price of these distributed to the poor. Blackstone refers it to the humane superstition of our ancestors; the forfeited chattel being intended, as were also the garments of a stranger found dead, to purchase masses for the soul of him who had been snatched from the world by sudden death. Deodands were abolished by the 9 and 10 Vic. c. 62.

ACCEPTANCE OF THE CHILTERN HUNDREDS.

A member of the House of Commons, not in any respect disqualified, can only vacate his seat by his acceptance of the stewardship of the Chiltern Hundreds, or some other nominal office in the gift of the Chancellor of the Exchequer. The practice began about the year 1750; but the duties of the stewardship have long since ceased, and the office is but retained to serve this particular purpose. The Chiltern Hills are a range of chalk eminences separating the counties of Bedford and Hertford, passing through the middle of Bucks from Tring in Hertfordshire to Henley in Oxfordshire. Formerly these hills were covered with thick beechwood, and sheltered numerous robbers; to put these marauders down, and protect the inhabitants of the neighborhood from their depredations, an officer was appointed under the

crown, called the Steward of the Chiltern Hundreds, which were Burnham, Desborough, and Stoke. The clump of noble "Burnham beeches" remains to remind us of the old stewardship duties.

DEATH WARRANTS.

An opinion is commonly entertained that the sovereign in England signs some instrument by virtue of which capital offences are punished with death; hence these presumed documents are popularly termed "Death-Warrants." Such, however, not only is not, but, as far as our knowledge goes, never has been the case.

The only authority for the execution of a criminal is the verbal sentence of the judge pronounced in open court, in a prescribed form of words. This the Sheriff, or his deputy, is bound to hear and to execute.

After the offenders are tried, the judge signs a list, containing the names, offences, and punishments of the convicts, and the names of the prisoners acquitted; and a copy of this list is given to the Sheriff. This list (commonly called a calendar) is, however, a mere memorandum, and of no binding authority whatever, the verbal sentence being the only and sufficient authority.

So important, indeed, does the law deem this verbal sentence of death to be, that it is very reluctant to use it in cases where probably it will not be carried into effect; and in such cases the judge is empowered by act of parliament to abstain from *passing* sentence of death, and to order such sentence to be *recorded* only.

At the old Bailey, the custom *formerly* was for the Recorder, at the termination of each session, to wait upon the sovereign with a list of all the prisoners lying under sentence of death; and, after explaining the several cases, to receive the royal pleasure thereon, and then, by a warrant under his (the Recorder's) hand, directed to the sheriffs, to command execution to be done on a day and at a place therein named. This practice continued until the accession of Victoria. in the first year of whose reign Mr. Baron Parke tried a man at the Old Bailey for a certain offence still by the letter of the law capital. From motives of delicacy it was deemed highly inexpedient to lay the details of the crime before the Queen; and, in order to prevent an infringement of the law, by neglecting so to do, a bill was hurried through parliament, by the first section of which it was enacted that for the future it should not "be necessary that any report should be made to her Majesty, her heirs and successors, in the case of any prisoner convicted before the Central Criminal Court, and now, or who may hereafter be under sen-

tence of death." Thus the practice at the Old Bailey is now assimilated to that of all the other courts in the kingdom, and the sovereign is never consulted about any capital offences whatever.

In this country, as a general rule, the record of the court is the only authority for the execution. But in Massachusetts every person sentenced to death is retained in prison one year, and then, unless the governor and council decide to reprieve or pardon him, the execution is ordered as of course.

CABINET COUNCILS.

It is remarkable how a change of very great importance in our system of government was brought about by pure accident. The custom of a king being present in a Cabinet Council of his ministers, which was the obvious, and had always been the usual, state of things, was put an end to when the Hanoverian princes came to the throne, from their ignorance of the English language. The advantage thence resulting of ministers laying before the sovereign the result of their full and free deliberations—an advantage not at all originally contemplated—caused the custom to be continued, and so established, that it is most unlikely it should ever be changed.—*Dr. Whately.*

It has not been the practice in modern times for the sovereign to consult the members of the Privy Council on political matters; indeed, the number of members of that body, amounting to nearly two hundred, would make such a reference to their advice impossible. Her Majesty has an undoubted right to command the services of any and every Privy Councillor; but none have a right to obtrude their advice except those members of the Council who are nominated by her Majesty as a committee of the whole body, and which is commonly known as the Cabinet.—*Letter from the Earl of Derby*, 1856.

TREASURE-TROVE.

Comparatively few persons have probably ever had occasion to inquire, or in any way to learn the law affecting treasure found under ground, technically known as "Treasure-trove;" but it may be useful to know some of the main points of the law affecting them. In the first place, to entitle either the Crown, or the subject to whom the regal right has been conceded, to treasure-trove, it must be clearly shown that the article found consists either in "money or coin, gold, silver, plate, or bullion;" and it must be shown (to the satisfaction of a jury, if need be), that it had been hidden *in* the earth, or other private place (we quote Blackstone), and that he who hid it is un-

known. The treasure, to be claimable treasure-trove, must have been designedly hidden—not intentionally abandoned—to entitle either the king or his feudatory to claim it.

The concealment of treasure-trove is a species of criminal neglect, which constitutes a misprision punishable by fine and imprisonment.

CURIOUS DIVISION OF SHIPS INTO OUNCES.

It was lately stated in evidence in a bankruptcy case in Wales, that the sixty-four shares into which a vessel, the ownership of which was connected with the case, was divided, were considered equal to one pound avoirdupois, the owner of four shares being called the owner of an ounce, of two shares of half an ounce, and so on. This resembles the uncial division among the Romans. See Cicero Pro Cæcina VI. sec. 17.

STANDARD GOLD.

Gold, when refined from all impurities and alloys of inferior metals, is *denominated* pure, or gold of twenty-four carats, this being the standard of purity recognized by the mint-master and the dealers in gold. In reality, however, there is no gold so very pure, but that it wants about a quarter of a carat of this standard. The carat is divided into $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$. These degrees serve to distinguish the greater or less quantity of alloy therein contained: for instance, gold of twenty-two carats has two parts of silver, or one part of silver and one of copper, and twenty-two of fine gold; that of twenty-three carats has half a part, or half a twenty-fourth of each.

PROLONGED ABSENCE NO LEAVE FOR A SECOND MARRIAGE.

It is a vulgar and very dangerous error to suppose that any term of absence of one of two persons married will, while that party is living, permit of the other marrying again. This misconception, but too fatally prevalent among the lower classes, has arisen from a clause in the statute relating to Bigamy, which provides that no punishment therein enacted shall extend to any person marrying a second time, whose husband or wife shall have been continually absent from such person for the space of seven years then last past, and shall not have been known by such person to be living within that time. Thus the party marrying under these circumstances is by this clause certainly protected from a conviction for bigamy, and its consequent pains and penalties, but that is all. The second marriage will nevertheless be absolutely void should the party absent turn out at any time, however

long, to have been alive when it was contracted. Nothing but death or a divorce *à vinculo matrimonii* can sever a marriage once legally performed.

CAN A CLERGYMAN MARRY HIMSELF.

This question was officially decided in the affirmative in the Court of Queen's Bench, Dublin, on Nov. 16, 1855, in the case of Beamish vs. Beamish, where the point came directly in issue.

WEIGHTS AND MEASURES OF COMMON ARTICLES OF MERCHANDISE.

The following table exhibits the weights and measures of various articles of merchandise which law and custom have generally sanctioned:

Apples, dry	pounds	per bushel	22
Barley	pounds	per bushel	48
Beans	pounds	per bushel	60
Beef	pounds	per barrel	200
Beef	pounds	per tierce	303
Coal	pounds	per ton	2,000
"	"	per bushel	80
Corn	pounds	per bushel	56
Corn, unshelled	pounds	per bushel	70
Corn, "in the ear,"	pounds	per bushel	70
Clover-seed	pounds	per bushel	60
Fish	pounds	per barrel	200
Flour	pounds	per barrel	196
Flax-seed	pounds	per bushel	56
Grindstones	pounds	per ton	2,000
Oats	pounds	per bushel	32
Onions	pounds	per bushel	43–57
Peaches, dry	pounds	per bushel	32
Pig-iron	pounds	per ton	2,240
Pork	pounds	per barrel	200
Potatoes	pounds	per bushel	56
Rye	pounds	per bushel	56
Salt, fine	pounds	per barrel	280
" "	pounds	per bushel	55
" coarse	pounds	per barrel	320
" "	pounds	per bushel	50
" sacks	pounds	per sack	14
Timothy-seed	pounds	per bushel	45
Wheat	pounds	per bushel	60
Water-lime	pounds	per barrel	300

WEIGHT OF COAL.

A recent decision of the United States Circuit Court at Philadelphia establishes the weight of a ton of coal at 2,240 lbs., instead of 2,000 lbs. The judge ruled that a company of grocers might as well meet and agree to reduce the number of ounces in a pound, and make the smaller number the standard of a pound for their customers, as for coal dealers to agree that the weight of a ton shall be 2,000 lbs., and furnish that amount to their customers.

HISTORY, GEOGRAPHY, AND STATISTICS.

WHO WAS THE MAN IN THE IRON MASK?

In the reign of Louis XIV. an unknown prisoner, of noble mien, was sent in profound secrecy to an island on the coast of Provence. The captive wore while travelling a mask said to have been of iron; a strict order having been given, that if he disclosed his features, he should instantly be put to death. The king's minister, Louvois, visited him, spoke to him while standing, treating him with the greatest respect. From Pignerol he was removed to other prisons, the same governor accompanying him; ultimately to the Bastille in Paris. Here he was treated with the same consideration; and the governor seldom sat down in his presence. He played the guitar, and dressed sumptuously. The same secrecy was preserved; even the physician who attended him never saw his face. No complaint ever escaped him, nor did he attempt to make himself known. He died in 1703, after twenty-four years' imprisonment, and was buried at night. The war-minister who succeeded Louvois was entreated, even on his death-bed, by his son-in-law, to explain the mystery of "the Man in the Iron Mask;" but he replied, it was a solemn secret of state which he had sworn never to reveal.

Various surmises have arisen respecting the name and station of the masked prisoner. At one time he was Fouquet, the disgraced minister of finance; at another, an Armenian patriarch. Some persons were sure it was Louis Comte de Vermandois, son of Louis XIV. and Mdlle. de la Vallière, though *he* was said to have died and been

buried in 1683. Others declared the person to be the Duc de Beaufort, who, however, had to all appearance been slain and beheaded by the Turks, at the siege of Candia. Next, he was imagined to be the Duke of Monmouth, whom the Londoners, if their eyes had not deceived them, saw executed on Tower Hill in 1685. But the opinion for some time generally received was, that he was a son of Anne, mother of Louis XIV.; and it was at one time boldly asserted that he was a twin-brother of that monarch.

Amidst these various notions, the following existed, but until 1825 obtained little credit: that "the Man in the Iron Mask" was Count Ercolo Antonio Matthioli, a senator of Mantua, a private agent of Ferdinand Charles Duke of Mantua, and that he suffered this long and strange imprisonment for having deceived and disappointed Louis XIV. in a secret treaty for the purchase of the fortress of Casal, the key of Italy; the agents of Spain and Austria having offered him a higher bribe. Yet their infamous scheme could not have been brought to light without exposing the shame of both the principals concerned.

The truth of this latter statement was proved beyond any reasonable doubt in 1826, by the publication of "The True History of the State Prisoner commonly called the Iron Mask, extracted from Documents in the French Archives, by the Hon. George Agar Ellis." In this work it is established that immediately after Louis perceived that he had been duped, Matthioli was arrested by the king's orders. Though armed, he offered no resistance, but was carried that night to Pignerol; the leader of the party only knowing the prisoner, whom, for better concealment, he named L'Estang. During his confinement at Pignerol his mind began to wander; when he was placed in the same room with an insane Jacobin monk. In 1681 the count and his companion were removed in a litter, and under military escort, to Exiles, a few leagues from Pignerol. Here the monk died; and in 1687 St. Mars, the custodian, who had removed with his charge to the Isle of St. Marguerite, reported of one prisoner only, whom we are warranted in concluding was Matthioli, the man in the iron mask. During his removal hither, he is thought to have been first compelled to wear a mask to hide his features, not, as has been erroneously stated, a mask made of iron, which could not have been borne upon the face for any long continuance of time, but one of black velvet, strengthened with whalebone and fastened behind the head with a padlock, and further secured by a seal, which did not prevent the prisoner from eating and drinking, or impede his respiration. At St. Marguerite he passed eleven years, and was described by Voltaire as

richly dressed, supplied with laces from Paris, served at table with silver plate, wearing a mask of iron, and plucking out the hairs of his beard with steel pincers,—all of which were gross exaggerations. In 1698 St. Mars removed with his prisoner to the Bastille. Matthioli travelled in a litter; and when St. Mars halted near his own estate of Pulteau, the unknown was seen in a black mask—a circumstance talked of in the neighborhood until our time. The peasants observed that his teeth and lips were seen, that he was tall, and had gray hair. His imprisonment extended to twenty-four and a half years, according to the horrible order issued by Louis, "that he should have nothing which could make life agreeable." He died in November 1703, being then sixty-three years of age; although the register of his burial states him as "Marchialdi, aged about forty-five years." But persons who died in the Bastille were frequently interred under false names and ages; and Louis and the Duke of Mantua were still alive. On the decease of the prisoner, his keepers scraped and whitewashed his prison-walls; the doors and window-frames were burned; and all the metal vessels, whether of copper, pewter, or silver, which had been used in his service, were melted down. When the records of the Bastille were made public in 1789, the register was searched in vain for any thing that would throw light on this affair; the leaf of the register which contained it had been carefully removed. Such is the true story of the Iron Mask.—*Curiosities of History.*

ROBIN HOOD.

A writer in the North American Review for January, 1857, concludes, on apparently good grounds, that Robin Hood was an inhabitant of the Manor of Wakefield, who followed Thomas, Earl of Lancaster, in his insurrection in the West Riding of Yorkshire in 1322, and that, after his defeat at the battle of Boroughbridge, he incurred outlawry as a rebel against Edward II. and took refuge in the forest of Barnsdale, where there is good evidence that he was in 1324, as leader of a company of archers. By some means or other he had an interview with Edward and became one of his court followers, but he did not long remain there, but took again to the woods, of which he became a permanent denizen.

On the other hand, Thierry, in his "Norman Conquest," conjectures that Robin Hood was an outlaw by birth, and the last of the Saxons who refused to recognize the Norman rule, and he supposes him to have been an opponent of Richard Cœur de Lion. Mr.

Spenser Hall, in his "Forester's Offering," imagines him to have been one of the followers of Simon de Montfort, and a fugitive from the battle of Evesham. Mr. Wright, in his Essay on the Middle Ages, argues that the legends of the peasantry may be trusted as enabling us with tolerable certainty to place Robin Hood among the personages of the early Teutonic people.

Robin Hood is first mentioned by a writer about the year 1360, though there is extant a ballad which is supposed to be a copy of one written in 1330, in which he is mentioned.

EL DORADO OF SIR WALTER RALEIGH.

The term *El Dorado* is commonly considered to have been the sovereignty teeming with precious metals, which had long been sought for in vain by Spanish adventurers. Their expeditions in quest of it were directed to the interior of the vast region lying between the Orinoco and the Amazon, or Guiana. The rocks were represented as impregnated with gold, the veins of which lay so near the surface, as to make it shine with a dazzling resplendency. The capital, Manoa, was said to consist of houses covered with plates of gold, and to be built upon a vast lake, named Parima, the sands of which were auriferous.

The term *El Dorado* was not, however, originally used to designate any particular place: it signified generally "the gilded," or "golden," and was variously applied. According to some, it was first used to denote a religious ceremony of the natives, in covering the anointed body with gold dust. The whole of Guiana was, on account of the above usages, sometimes designated by the term *El Dorado;* but the locality of the fable which came to appropriate that name, was successively assigned to different quarters of that vast region, and the expeditions in search of it varied accordingly. The question, however, to be solved is, whence arose the belief that a district so marvellously abundant with the precious metals existed in the interior of Guiana; and the solution appears to have been left to Humboldt. While exploring the countries upon the Upper Orinoco, he was informed that the portion of Eastern Guiana lying between the rivers Essequibo and Branco is "the classical soil of the Dorado of Parima." In the islets and rocks of mica-slate, and talc which rise up within and around a lake adjoining the Parima river, reflecting from their shining surfaces the rays of an ardent sun, we have materials out of which to form that gorgeous capital, the temples and houses of which were overlaid with plates of beaten gold.

THE OLYMPIC GAMES.

This great festival was held on the banks of the Alpheius, in Peloponnesus, near the old oracular temple of the Olympian Zeus (Jupiter), and attracted its crowds of visitors and maintained its celebrity for many centuries after the extinction of Greek freedom; and only received its final abolition, after more than eleven hundred years' continuance, from the decree of the Christain emperor Theodosius, in 394 A. D. The games were originally a match of runners in the stadium, or measured course; and a series of the victorious runners, formerly inscribed and preserved by the Eleians, beginning with Koræbus in 776 B. C., was made to serve by chronological inquirers from the third century B. C. downwards, as a means of measuring the chronological sequence of Grecian events, hence called Olympiads. The competitors contended not for money, but for glory; and the prize was a wreath from the sacred olive-tree near Olympia, and the honor of being proclaimed victor. In the 18th Olympiad were added the wrestling-match, and the complicated Pantathlon, including jumping, running, the quoit, the javelin, and wrestling. In the 23d Olympiad (688 B. C.) was added the boxing-match; and in the 25th (680 B. C.) the chariot, with four full-grown horses. In the 33d Olympiad (648 B. C.) were added the single race-horse, and the Pankration, or boxing and wrestling conjoined, with the hand unarmed or divested of the hard leather cestus worn by the pugilist, which not only rendered the blow of the latter more terrible, but at the same time prevented him from grasping his adversary. Among other novelties added were the race between men clothed in full panoply and each bearing his shield; matches between boys, colts, &c. At the maximum of its attraction, the Olympic solemnity occupied five days: but until the 77th Olympiad, all the various matches had been compressed into one—beginning at daybreak, and not always closing before dark. Thus, during two centuries succeeding 776 B. C., the festival gradually passed from a local to a national character, bringing together in temporary union the dispersed fragments of Hellas, from Marseilles to Trebizond. During the sixth century B. C., three other festivals, at first local, became successively nationalized—the Pythia near Delphi, the Isthenia near Corinth, the Nemea near Kleonæ, between Sikyon and Argos.—Abridged from GROTE's *History of Greece*, vol. iv.

VENERABLE BEDE.

Beda, or Bede, an English monk, was one of the brightest ornaments of the eighth century, and one of the most eminent fathers of

the English Church, whose talents and virtues procured him the name of *Venerable Bede.* He was born about A. D. 672, at Monkton, Durham (only a few years after the introduction of Christianity into England); at seven years of age was sent to the monastery of St. Peter, where he was carefully educated for twelve years. He was ordained deacon at nineteen, and priest at thirty, and never quitted his monastery.

His most valuable work is a *Latin History of the English Church*, in five books, from the time of Julius Cæsar to A. D. 731; with a continuation of the Acts of the English before the the Saxon Invasion, by an anonymous author. An epitome of his work, down to A. D. 766, is said to have been made by Richard Lavington, a Carmelite monk of Bristol, and a great writer of divinity, about the end of the fourteenth century. Few works have either so long supported their credit, or have been so universally known and consulted; and it may be considered as an entirely novel subject in England, since the civil histories which existed before it contained but few particulars on ecclesiastical affairs. It was principally compiled from the information of his contemporaries, and the records of religious houses; which may probably account for its favoring the Saxons against the Britons, and its too great credulity as to legends and miracles. The last and best of Bede's works was his Epistle to Egbert, Bishop of York, illustrating the state of the Church in his time, and representing several evils in it, of which he foresaw the increase, and which were afterwards removed by the Reformation. —Thomson's *Illustrations of the History of Great Britain.*

To him we owe all our knowledge of English history, from the landing of the Saxons in Kent to his time (nearly three centuries), and all our certain information respecting the various tribes who then inhabited this island; from him it is apparent that the Saxon chronicler copied long passages.

DAMON AND PYTHIAS.

The most celebrated instance of the friendship of these two Pythagoreans occurred in the reign of Dionysius the Younger, the tyrant of Sicily; whose courtiers contended that the boasted virtues of the Pythagoreans, their determined spirit, and firmness in friendship, were mere illusions, which would vanish on the first appearance of danger or distress. To prove this assertion, they agreed to accuse Pythias (properly Phintias) of a conspiracy against the sovereign. He was summoned before the tyrant, accused, and condemned to die. Pythias replied, if it were so, he would only beg the

favor of a few hours, that he might go home and settle the common concerns of his friend Damon and himself; in the mean time, Damon would be security for his appearance. Dionysius assented to this proposal; and when Damon surrendered himself, the courtiers all sneered, concluding that he was duped; but on the return of Pythias in the evening to release his bail, and submit to his sentence, they were quite astonished; and none more than the tyrant himself, who embraced the illustrious pair, and requested they would admit him to a share of their friendship.

THE SEVEN WISE MEN OF GREECE.

Neither the number nor the names of this constellation of wise men are given by all authors alike. Dikæarchus numbered ten, Hermippus seventeen: the names of Solon the Athenian, Thales the Milesian, Pittakus the Mitylenean, and Bias the Prienean, were comprised in all the lists; and the remaining names, as given by Plato, were Kleobulus of Lindus in Rhodes, Myson of Chênæ, and Cheilon of Sparta. Among their sayings or mottoes, inscribed in the Delphian temple, were, "Know thyself," "Nothing too much, "Know thy opportunity," "Suretyship is the precursor of ruin." Bias is praised as an excellent judge, and Myson was declared by the Delphian oracle to be the most discreet man among the Greeks, according to the testimony of the satirical poet Hipponax. This is the oldest testimony (540 B.C.) which can be produced in favor of any of the seven; but Kleobulus of Lindus, far from being universally extolled, is pronounced by the poet Simonides to be a fool. Dikæarchus, however, justly observed that these seven or ten persons were not wise men or philosophers in the sense which those words bore in his day, but persons of practical discernment in reference to man and society—of the same turn of mind as their contemporary, the fabulist Æsop, though not employing the same mode of illustration. Solon, Pittakus, Bias, and Thales, were all men of influence in their respective cities. Kleobulus was despot of Lindus, and Periander (by some numbered among the seven) of Corinth. Thales stands distinguished as the earliest name in physical philosophy, with which the other contemporary wise men are said not to have meddled. Most of them, if not all, were poets, or composers in verse; and there is ascribed to them an abundance of pithy repartees, together with one short saying or maxim peculiar to each, serving as a sort of distinctive motto; indeed, one test of an accomplished man about this time was, his talent for singing or reciting poetry, and for making smart and ready answers.—Abridged from GROTE's *Hist. Greece.*

THE ELEUSINIAN MYSTERIES.

These mysteries were originally celebrated at Eleusis, in Attica, with solemn shows and great pomp of machinery, which drew a mighty concourse to them from all countries. The shows are supposed to have exhibited a representation of heaven, hell, elysium, purgatory, and all that related to the future state of the dead; and they are frequently alluded to by the ancient poets. Chillius, in his comments on the sixth book of the *Æneid*, observes, that Virgil, in describing the descent into hell, is but tracing out in their genuine order the several scenes of the Eleusinian shows. A passage in Isocrates leads strongly to the belief that the doctrine of the immortality of the soul was taught at Eleusis.

THE PILLARS OF HERCULES.

This was among early navigators the name given to the Straits of Gibraltar. That the waters surrounding their islands and the Peloponnesus formed part of a sea circumscribed by assignable boundaries, intelligent Greeks learnt for the first time from the continuous navigation of the Phokæans round the coasts, first of the Adriatic, and next of the Gulf of Lyons to the Pillars of Hercules and Tartessus. The Pillars of Hercules, especially, long remained deeply fixed in the Greek mind as a terminus of human adventure and aspiration: of the ocean beyond, men were for the most part content to remain ignorant.

THE LABYRINTH OF CRETE

Was formed by Dædalus to secure the Minotaur, about 1210 B. C. Captain Rochfort Scott, who examined this reputed marvel of antiquity in 1837, found it to be one of the natural caverns common in the island, and which may have served in early ages as a place of refuge. It is, however, doubted whether this is the famed labyrinth from which Theseus was delivered by the contrivance of the love-stricken Ariadne; the locality ill agrees with the ancient account of the Minotaur's abode; for veracious Greek authors state that it opened on the sea-shore, whereas the above cavern is six miles from the coast.

WHO WERE THE SYBARITES?

Of the Sybarites, a prosperous and powerful nation in the Gulf of Tarentum, few statements have reached us, save of their luxury, fantastic self-indulgence, and extravagant indolence, for which they have

become proverbial. Among gay companies "Sybaritic tales" were the sayings and doings of ancient Sybarites. Herodotus tells of one Smyndrides of Sybaris, "the most delicate and luxurious man ever known," who was said to have taken with him to Greece, on his marriage, one thousand domestic servants, fishermen, bird-catchers, and cooks. Five thousand horsemen, we are told, showily caparisoned, formed the processional march in certain Sybaritic festivals. Aristotle relates that the Sybaritic horses were taught to move to the sound of the flute; and the garments of these wealthy citizens were composed of the finest wool from Miletus in Ionia, with which Sybaris carried on great traffic. The town was named from the river on which it was built, and this from Sybaris, a fountain in Achaia, which intoxicated the people who drank of it.

THE OSTRACISM OF THE GREEKS.

By the Ostracism, a citizen was banished without special accusation, trial, or defence, from his native city to some other Greek city. As to reputation, the ostracism was a compliment rather than otherwise. The process was carried into effect by writing on the shell of an oyster, *ostrea*, (or potsherd), the name of the person whom a citizen thought it prudent for a time to banish; a day was named; the agora was railed round, with ten entrances left for the citizens of each tribe, and ten separate casks or vessels for depositing the suffrages, shells or potsherds. If at the end of the day the number of votes against any one person was six thousand, that person was ostracized; if not, the ceremony ended in nothing. Ten days were allowed to him for settling his affairs; he was then required to depart from Attica for ten years, but retained his property, and suffered no other penalty.

There was at Syracuse a similar institution, called the *Petalism*, because in taking the votes the name of the citizen intended to be banished was written upon a leaf of olive instead of a shell or potsherd.

THE RUBICON.

The Rubicon is considered by Cluverius and D'Anville to be the Fiumecino of Italy, and their opinion is supported by the inhabitants of Rimini, in whose territory it is; the point being a ford on the road from Ravenna. The celebrity of the event has passed into a proverb: hence, to *pass the Rubicon* is to take a desperate step in an enterprise,

or to adopt a measure from which one cannot recede, or from which he is determined not to recede.

THE PANDECTS OF JUSTINIAN.

The Pandects (*pandectæ*, "embracing all") are a digest of Roman law, made by order of Justinian from the writings of Roman jurists. The earliest MS. is preserved in the Laurentian Library at Florence, and was captured by the Pisans when they stormed Amalfi in 1135. It was formerly generally believed, but on insufficient evidence, that, in consequence of this discovery, the study of the civil law was revived, and its jurisprudence ultimately adopted throughout the greater part of Europe. This MS. was preserved at Pisa with as much veneration as if it had been the palladium of the republic; and when, after the fall of Pisa in 1406, it was removed to Florence, equal veneration long continued to be paid to it. Tapers were lighted, monks and magistrates stood bareheaded as before holy relics, and the books were opened beneath a silken pall. The work is written in a bold and beautiful character, "is composed of two quarto volumes, with large margin, on a thin parchment, and the Latin characters betray the hand of a Greek scribe."—Gibbon.

GREEK FIRE.

In the east of Europe the Greek fire was known as early as the year 673; when, according to the historians of the lower empire, Callinicus, the philosopher, taught the use of it to the Greeks. He himself had, probably, derived the knowledge of this composition from the Arabians; for, though powder acting by *detonation* (and consequently cannon) appears to have been first produced in Europe, and that not earlier than the beginning of the fourteenth century, the Asiatics had the use of powder that would *fuse* at a very early date. The Greek fire was discharged from tubes, which could be turned in any direction. The Princess Anna Comnena, in the *Alexiad*, describes its use as it was employed by the Emperor Alexis against the Pisans, from tubes fixed at the prow of his vessels: "They (the Pisans) were astonished to see fire, which by its nature ascends, directed against them, at the will of their enemy, downwards, and on each side." The receipt for the composition of the Greek fire may be found in the treatise of Marcus Græcus. The terrors of these early fire-mixtures were enhanced by the belief that not only they, but the flames kindled by them, were inextinguishable by water. The Greek fire did not, how-

ever, reach the west of Europe till a much later period.—HEWITT *on Ancient Armor.*

COMEDY AND TRAGEDY.

The first comedy was acted at Athens, on a scaffold, by Saffrarian and Dolon, 562 B. C.; and tragedy was first acted at Athens, in a wagon or cart, 535 B. C., by Thespis. Melpomene is the presiding muse of tragedy; she is represented as a splendidly attired young woman, with a serious countenance; she wears a buskin, and holds a dagger in one hand, and in the other a sceptre and crowns. Thalia is the muse of comedy; she leans on a column, holds a mask in her right hand, and carries a shepherd's crook.

ORIGIN OF MAGNA CHARTA.

King John having exercised the power of recruiting men for repairing fortresses, bridges, and roads; of levying contributions of corn and cattle in his journeys; and of seizing beasts of burden, carts, and agricultural implements;—this touched the interests of the proprietors of the soil and the serfs, who helped to "clothe" it. The barons combined, resisted, and extorted Magna Charta. Strange to say, this great instrument of national freedom had no nobler origin than this! Indeed, one article of the great Charter forbids the destruction of houses, woods, or *men*, without the special license of the *proprietor*, who had full power over the life of Englishmen. It is a great mistake to suppose that the war of the barons against John Lackland was waged for the benefit of the subjects, or that the treaty of Runnymede secured their liberties. They were never thought of by either party, except as liable to be slaughtered like cattle in the barbarous reprisals which the belligerents made on one another's properties.—*North British Review*, No. 12.

Magna Charta, if not the original, a copy made when King John's seal was affixed to it, was acquired by the British Museum with the Cottonian Library. It was nearly destroyed in the fire at Westminster in 1731; the parchment is much shrivelled and mutilated, and the seal is reduced to an almost shapeless mass of wax. The MS. was carefully lined and mounted, and is now secured under glass. It is about two feet square, is written in Latin, and is quite illegible. It is traditionally stated to have been bought for fourpence, by Sir Robert Cotton, of a tailor, who was about to cut up the parchment into measures! But this anecdote, if true, may refer to another copy of the Charter preserved at the British Museum; and the original Char-

ter is believed to have been presented to Sir Robert Cotton by Sir Edward Dering, lieutenant-governor of Dover Castle; and to be that referred to in a letter dated May 10, 1630, extant in the Museum Library.

"The Commissioners on the Public Records regarded the original of Magna Charta preserved at Lincoln as of superior authority to either of those in the British Museum, on account of several words and sentences being inserted in the body of that Charter, which in the latter are added at the foot, with reference marks to the four places where they were to be added. These notes, however, possibly may prove that one of the Museum Charters was really the first written, to which those important additions were made immediately previous to the sealing on Runnymede, and therefore the actual original whence the more perfect transcripts were taken."—RICHARD THOMSON, author of *An Historical Essay on the Magna Charta of King John*, *&c.*, 1829.

FOR WHAT PURPOSE WERE THE PYRAMIDS OF EGYPT ERECTED?

This question has been much controverted.

One opinion is, that the Pyramids were *the granaries of Joseph*, which may be confuted by the smallness of the rooms, and the time required in building. The Arabians generally think they were built by King Saurid, before the Deluge, as a refuge for himself and the public records from the Flood. Josephus, the Jewish historian, who wrote A. D. 71, ascribes them to his countrymen during their captivity in Egypt. Shaw and Bryant believed them to be temples, and the stone-chest a tank for holding water for purification. Pauw, contemporary with Shaw and Bryant, considers the Great Pyramid as the tomb of Osiris. Others suppose the Pyramids to have been associated with worship; in conjunction with which it may be mentioned, that in the Sandwich Islands, Ellis, the missionary, saw a solid pyramidal structure, in front of which the images were kept, and the altars fixed. But the greater number of writers, ancient and modern, believe the Great Pyramid to be the tomb of Cheops, the alleged builder: Maillet, in 1760, added, that the chambers were built for shutting up the friends of the deceased king with the dead body; and through the holes on each side of the central chamber they were to be supplied with food, &c.; yet more absurdly, an old Moulah, in 1799, told Buonaparte, when in Egypt, that the object was to keep the buried body undecayed, by closely sealing up all access to the outward air. Another ingenious theory ascribes the Pyramids to the Shepherd Kings,

a foreign pastoral nation which oppressed Egypt in the early times of the Pharaohs. Wilkinson says: "I do not pretend to explain or decide the real object for which these stupendous monuments were constructed, but feel persuaded that they have served for tombs, and have also been intended for astronomical purposes. For though it is vain to look for the pole-star at the bottom of a passage descending at an angle of 27°, or to imagine that a *closed* passage, or a pyramid covered with a smooth and inaccessible casing was intended for an observatory; yet the form of the exterior might lead to many useful calculations. They stand exactly due north and south; and while the direction of the faces to the east and west might serve to fix the return of a certain period of the year, the shadow cast by the sun, or the time of its coinciding with their slope, might be observed for a similar purpose."

Aristotle's opinion, now generally adopted (*Pol.* v. ii.), is that the Pyramids were built "to keep the people well employed and poor;" because "it suits tyranny to reduce its subjects to poverty, that they may not be able to compose a guard; and that being employed in procuring their daily bread, they may have no leisure to conspire against their tyrants."

Baron Dupin calculates that the combined action of the steam-engines at work in Britain, some twenty years since, could raise from the quarries, and place as they now are, all the stones of the Great Pyramid in eighteen hours!

ORIGIN AND HISTORY OF THE PAPAL TIARA.

It was John XXII. who added a third crown to the pontifical tiara. Originally the head-dress of the Popes was only a cap, a little higher than the caps ordinarily worn, not unlike the Phrygian mitre used in ancient days by the priests of Cybele; but Clovis, king of the Franks, to show his respect to the Church of Rome, sent thither a royal crown of gold, which Anastatius, emperor of Constantinople, had presented to him. The Pope Hormisdas placed upon the tiara this crown, which was at that time nothing more than a circle of gold surmounted by leaf-work. The successors of Hormisdas continued to wear the tiara with one crown only up to the time of Boniface VIII.; but this pope claiming authority over things temporal as well as things spiritual, wished to mark this double dominion even on the pontifical tiara, on which he placed two crowns instead of one. Ultimately Pope John XXII. added a third crown. The three together now form the ornament of the Papal tiara.—ABBE CHOISY.

Other authorities say that the third crown was added by Urban V.

THE POPE'S BULL.

The word *Bulla*, or Bull, appears for a considerable time to have meant only a gold trinket-ring worn round the necks of children. Later, however, the *bulla* was synonymous with *annulus*, or ring; and the words *bullare* and *sigillare* meant the same thing—to seal. The pontifical *Bullæ*, or bulls, like every thing else connected with the Pope's perquisites—as his rings, his crowns, his keys—were three in number: the *annuli* consisting, imprimis, of that called *piscatory*, in virtue of which he backs his pretensions to supremacy against all the world of heretics; secondly, the large leaden seal, or bull proper; and lastly, the *signum*, for consistorial bulls.

As soon as a pope dies, the Apostolic Chamber sends for the pontifical plumber, who, in the presence of that body, cuts off the portion of the double seal, or Bulla, which bears the name of his defunct holiness, thereby rendering the other and larger moiety (impressed with the leaden images of St. Peter and St. Paul) incapable of sending out excommunications till the consecration of a new pope adds a new name, and again gives solidity to the instrument.

ROMAN CROWNS OF TRIUMPH.

The Civic Crown, though made only of oaken leaves, was esteemed the most reputable badge of martial virtue, and never bestowed but for saving the life of a citizen, and killing at the same time an enemy. *The Laurel Crown* was the proper ornament of triumph, as myrtle was of the ovation. Tiberius wore a laurel crown, in the belief that it would protect him from lightning and thunder. *The Obsidional Crown*, though made only of the common grass that happened to be found upon the scene of action, was esteemed the noblest reward of military glory, and never bestowed but for the deliverance of an army when reduced to the last distress. *The Mural Crown*, an embattled circlet, was given to him who first scaled the walls of a besieged city, and there planted a standard. *The Naval Crown* was given to him who first boarded an enemy's ship: it was a circle of gold, surmounted by nautical emblems, including the beaks of ships; hence it was called *rostra*.

THE IRON CROWN OF LOMBARDY.

When the Emperor Napoleon I. was crowned King of Italy (at Milan on May 23, 1805), he placed the iron crown of the kings of Lombardy upon his head with his own hands, exclaiming, *Dieu me l'a*

donné, gare à qui la touche ("God has given it to me, beware who touches);" which Sir Walter Scott designates as the haughty motto attached to it by its ancient owners.

The crown takes its name from the narrow iron band within it, which is about three-eighths of an inch broad and one-tenth of an inch in thickness. It is traditionally said to have been made out of one of the nails used at the crucifixion, and given to Constantine by his mother, the Empress Helena, the discoverer of the Cross, to protect him in battle. Afterwards it was used at the coronations of the Lombard kings; primarily at that of Agilulfus, at Milan, in the year 591.

The crown is kept in the Cathedral of Monza. The outer circlet is composed of six equal pieces of beaten gold, joined together by hinges, and set with large rubies, emeralds, and sapphires, on a ground of blue gold enamel. Within the circlet is "the iron crown," without a speck of rust, although it has been exposed more than 1,500 years. After his coronation at Milan, Buonaparte instituted for Italy a new order of knighthood, called "Of the Iron Crown."

THE BED OF JUSTICE.

This expression (*lit de justice*) literally denoted the seat or throne upon which the king of France was accustomed to sit when personally present in parliaments; and from this original meaning the expression came in course of time to signify the parliament itself. Under the ancient monarchy of France a bed of justice denoted a solemn session of the king in parliament. According to the principle of the old French constitution, the authority of the parliament, being derived entirely from the crown, ceased when the king was present; consequently all ordinances enrolled at a bed of justice were acts of the royal will, and of more authenticity and effect than decisions of parliament.

The last Bed of Justice was assembled by Louis XVI. at Versailles, on the 6th of August 1788, at the commencement of the French Revolution, and was intended to enforce upon the parliament of Paris the adoption of the obnoxious taxes which had been previously proposed by Calonne at the assembly of Notables. The resistance to this measure led to the assembly of the States-general, and to the Revolution.

THE CAP OF LIBERTY.

After the death of Cæsar, we are told, in the *Life of Cicero*, that the conspirators marched out in a body, with a Cap, as the ensign of

Liberty, carried before them on a spear. There was a medal struck on the occasion, with the same device, which is still extant. The thought, however, was not new; for Saturninus, in his sedition, in 263, when he had possessed himself of the Capitol, exalted a cap also on the top of a spear, as a token of liberty to all slaves who would join with him; and Marius used the same expedient to incite the slaves to take arms with him against Sylla. For slaves to wear the cap was a prize.

ORIGIN OF THE RED CAP AS AN EMBLEM OF REVOLUTION.

Nearly a month later, on March 14, another symbol of the Revolution, the famous red cap, appeared for the first time in the galleries of the Jacobin Club. The red cap was also a work of the Girondists, and owed the favorable reception which it soon found principally to an article of Brissot's, in the "Patrioté Français" for February 6, in which, supported by a similar view of an English philosopher named Pigot, he formally declared war upon hats. "The priests and despots," it was said in the reasoning borrowed from this English enemy of hats, "are the ones who introduced the mournful uniform of hats, as well as the ridiculous and slavish ceremony of a salute, which debases man, inasmuch as it makes him bow his bared head submissively before his equal." It was then historically proved that all "great nations," the Greeks, Romans, Gauls, had held the cap in peculiar honor, "in order to distinguish themselves from the barbarian nations, as a sign of triumph over their tyrants;" and that, in more modern times, Voltaire and Rousseau had worn it as a symbol of freedom. The red color was expressly recommended "as the most cheerful!" Nothing more was needed to make the red cap at once the political fashion; and by the middle of March it had been silently adopted as a custom that the president and secretaries of the Jacobin club, as well as the orators, while speaking, should wear the red cap. Still, many persons objected to it, but no one seems to have spoken out against it till March 19,—the very day on which Dumouriez, the Minister of Foreign Affairs, adorned with this emblem of freedom and equality, expounded his political creed from the rostrum of the Jacobin Club,—when Pétion sent a letter to the Club upon the subject, giving his reasons for opposing the introduction of the red cap. The reading of this letter produced a great and probably unexpected effect. Before it was finished, the president had quietly slipped his cap into his pocket, the secretaries had followed his example, and the red cap had entirely disappeared from the hall; and thus after a brief existence of five days, for Gran-

geneuve, the Girondist, had first worn it in the club on March 14,—was the red cap banished from the hall. Still, though Pétion and Robespierre could exclude it from the Jacobin Club, they could not prevent its continued use by the people; for the Girondists continued to uphold it, till the insurrection of June 20 made it the emblem of the victory of republicanism over monarchy. We must add, that the real origin of the red cap has never been clearly explained; and opinions were very much divided upon the subject at the time. A quite generally received opinion was that it first came into use after the release from the galleys of the Swiss soldiers of the regiment of Chateau-Vieux. It is well known that the galley-slaves wore such caps, which suddenly became the symbols of freedom on the release of those soldiers. Concerning the red color, it should be remarked that it was then by no means the color of the democratic republic and the symbol of freedom. On the contrary it was regarded as that of despotism and oppression, and especially had it acquired a bad reputation among patriots through "the red book" and the red flag as the instrument of martial law. The "red republic," "red apparitions," and other red things and nothings, are of much later invention.—Dr. ZINKEISEN's *History of the Jacobin Club.*

PIKES IN THE FRENCH REVOLUTION.

On Feb. 19, 1792, people armed with pikes appeared for the first time in the Jacobin Club. The pike, the peculiar weapon of the Revolution, had fallen into disuse, and been almost entirely forgotten since the terrible scenes of 1789, having been gradually supplanted by the gun of the national guards; and it was only when the war question began to occupy every mind, that it was again sought out, and recommended by the advocates of an offensive war. As early as December, 1791, Brissot caused a picture of a pike, such as had been used in 1789, to be engraved in the "Patriote Français" as a curiosity and model; and he accompanied it with directions for its use and improvement. From that time, the cry for pikes became the order of the day in the journals of that party, and the manufacture of them was pursued with great activity as early as January, especially in the Revolutionary suburbs of St. Antoine and St. Marceau. In the Jacobin Club pikes were first mentioned on February 7, when a smith laid four pikes of his manufacture on the table for approval, and a special committee was appointed for the purpose. The question of pike or no pike soon became a party one; the Girondists, with Brissot as their leader, defending the weapon, while the Feuillans opposed it, as intended to be used against

the national guards. The discussion was animated and bitter. It was during this discussion in the newspapers that men with pikes appeared in the Jacobin Club; and when it was objected that this was unlawful, it was resolved, "in order to conciliate principles and actions," that the pikes should be placed on both sides of the president, and that in future a pike should be hung with every flag in the hall, "as a sign of the union between the bayonet and the pike." Thus the pike, as the weapon of the people, became thenceforth the symbol of the Revolution, while the dagger was regarded as that of the Counter-Revolution.—Dr. Zinkeisen's *Geschichte des Jakobiner Klubs.*

THE LION IN THE ARMS OF ENGLAND.

The Lion, popularly "king of beasts," and the emblem of majesty and might, is the symbol of the British nation, and is borne in the royal arms, of which it forms one of the supporters, and which it surmounts as the crest. But the maneless feline beast which occurs in the older armorial bearings is thought to have been intended to represent *a lion leoparded.* This term is still used by the heralds of France. If the full face is shown, the animal, whether maned or maneless, is in their language a leopard; if the side face alone is seen, it is a lion. Hence, with them, the lions passant and gardant of the arms of the kings of England would be either lions leoparded or lions maned. The omission of the mane in rude tricking, would reduce them to leopards, which they were originally considered. The Emperor Frederick, in choosing his presents to Henry III., was actuated, according to Matthew Paris, by the bearing in the royal shield of England, *In quo tres leopardi transeuntes figurantur.*—Capt. Smee: *Zool. Trans.*

ORIGIN OF BRITANNIA.

At Lethington Castle, in East Lothian, is a full-length portrait, by Lely, of Frances Theresa Stuart, Duchess of Lenox, the most admired beauty of the court of Charles II. It is stated by Grammont that the king caused this lady to be represented as the emblematical figure *Britannia* on the coin of the realm. The portrait represents a tall woman, with that voluptuous fulness of feature and person which seems, perhaps from the taste of the painter, to characterize the beauties of this reign. She leans upon the base of a pillar, and has an aspect of the utmost sweetness. Her luxurious hair falls upon her fair white shoulders and her half-seen bosom. She is magnificently attired in purple, and a profuse robe of green, falling away from her shoulders,

comes round her limbs, and draws the purple garment nearer to her figure. A figure, however, not unlike that of Britannia, is to be found upon the large brass coins of Hadrian and Antoninus Pius.

ST. ANDREW'S CROSS.

The cross of St. Andrew is always represented in the shape of the letter X; but that this is an error ecclesiastical historians prove, by appealing to the cross itself on which he suffered, which St. Stephen of Burgundy gave to the convent of St. Victor, near Marseilles, and which, like the common cross, is rectangular. The cause of the error is thus explained: when the Apostle suffered, the cross, instead of being fixed upright, rested on its foot and arm, and in this posture he was fastened to it: his hands to one arm and the head, his feet to the other arm and the foot, and his head in the air.—YEPES.

THE DOUBLE-HEADED EAGLE.

The origin of the device of the Eagle on national and royal banners may be traced to very early times. It was the ensign of the ancient kings of Persia and Babylon. The Romans adopted many other figures on their camp-standards; but Marius, B. C. 102, made the eagle alone the ensign of the legions, and confined the other figures to the cohorts. From the Romans, the French under the empire adopted the eagle. The emperors of the Western Roman Empire used a black eagle, those of the East a golden one. The sign of the golden eagle, met with in taverns, is in allusion to the emperors of the East. Since the time of the Romans almost every state that has assumed the designation of an empire has taken the eagle for its ensign: Austria, Prussia, Russia, Poland, and France, all took the eagle. The two-headed eagle signifies a double empire. The emperors of Austria, who claim to be considered the successors of the Cæsars of Rome, use the double-headed eagle, which is the eagle of the eastern emperors with that of the western, typifying the "Holy Roman Empire," of which the emperors of Germany (now merged in the House of Austria) consider themselves as the representatives. Charlemagne was the first to use it; for when he became master of the whole of the German Empire, he added the second head to the eagle, A. D. 802, to denote that the empires of Rome and Germany were united in him. As it is among birds the king, and being the emblem of a noble nature from its strength of wing and iron courage, and also of conscious strength and innate power, the eagle has been universally preferred as the conti-

nental emblem of sovereignty. Of the different eagles of heraldry, the black eagle is considered the most noble, especially when blazoned on a golden shield.—*Notes and Queries.*

NAPOLEON'S BEES.

Napoleon I., wishing to have some regal emblem more ancient than the *fleur-de-lys*, is said to have adopted the Bee under the following circumstances. When the tomb of Childeric (the father of Clovis) was opened in 1653, there were found, besides the skeletons of his horse and page, his arms, crystal orb, &c.; there were also found more than 300 models of what the French Heralds mistook for bees, "of the purest gold, their wings being inlaid with a red stone, like cornelian." These "bees" were accordingly sprinkled over the imperial robe, as emblematical of enterprise and activity. But these small ornaments, *resembling bees*, were only what in French are called *fleurons*, supposed to have been attached to the harness of the war-horse. Handfuls of them were found when the tomb was opened at Tournay, and sent to Louis XIV. They were deposited on a green ground at Versailles, which was adopted by Napoleon as the original Merovingian color. This fact was related to Mr. W. Ewart, M. P., by Augustin Thierry, the celebrated historian.

THE STARS AND STRIPES.

The American flag originated in a resolution of Congress, June 13, 1777, "That the flag of the thirteen United States be thirteen stripes, alternately red and white; that the Union be thirteen stars, white in a blue field, representing a new constellation." The combination is thought to have been derived from the arms of General Washington, which contains three stars in the upper portion, and three bars running across the escutcheon; if this is not correct, the coincidence is striking. There were, however, several flags used before the striped flag. Thus, in March, 1775, "a Union flag with a red field" was hoisted at New York upon the liberty pole, bearing the inscription, "George Rex, and the liberties of America," and upon the reverse, "No Popery." On the 18th of July, 1778, General Putnam raised, at Prospect Hill, a flag bearing on one side the Massachusetts motto, "Qui transtulit sustinet," on the other "An appeal to Heaven." In October of the same year the floating batteries at Boston had a flag with the latter motto, the field white with a pine tree upon it. This was the Massachusetts emblem. Another flag, used during 1775 in some of the colonies, had upon it a rattlesnake coiled as if about to

strike, with the motto "Don't tread on me." The grand union flag of thirteen stripes was raised on the heights near Boston, January 2, 1776. Letters from there say that the regulars in Boston did not understand it; and as the King's speech had just been sent to the Americans, they thought the new flag was a token of submission. The British Annual Register of 1776 says:—"They burnt the King's speech, and changed their colors from the plain red ground, which they had hitherto used, to a flag with thirteen stripes, as a symbol of the number and union of the colonies." A letter from Boston about the same time, published in the "Pennsylvania Gazette," for January, 1776, says:—"The grand Union flag was raised on the 2d in compliment to the United Colonies." The idea of making each stripe for a State was adopted from the first; and this fact goes far to negative the supposition that the private arms of General Washington had any thing to do with the subject. The pine tree, rattlesnake, and striped flag were used indiscriminately until July, 1777, when the blue Union with the stars was added to the stripes, and the flag established by law. Formerly a new stripe was added for each new State admitted to the Union, until the flag became too large, when by act of Congress the stripes were reduced to the old thirteen; and now a star is added to the Union at the introduction of each new State. The standard of the army is fixed at six feet six inches by four feet four inches; the number of stripes is thirteen, viz: seven red and six white. It will be perceived that the flag is just one half longer than it is broad, and that its proportions are perfect when properly carried out. The first stripe at the top is red, the next white, and so down alternately, which makes the last red. The blue "field" for the stars is the width and square of the first seven stripes, viz: four red and three white. These stripes extend from the side of the "field" to the extremity of the flag. The next stripe is white, extending the entire length of it, and directly under the field in strong and pleasing relief, then follow the remaining stripes alternately. The number of stars on the field is now thirty-one.

THE UNION JACK.

The British flag consists of the crosses of St. George, St. Andrew, and St. Patrick, united; but the etymology of the term "Union Jack" has never, it is presumed, been explained, for it does not occur in any lexicon or glossary. The word "Union" obviously arose from the event to which the flag owes its origin (the Union of Ireland, in 1801); the only difficulty, therefore, is as to the expression "Jack." As the alteration in the banner of St. George occurred in the reign of James I.,

it may with great probability be supposed to be a corruption of Jacques." If, however, this hypothesis be rejected, the following is submitted. English soldiers were formerly accustomed to wear the cross of St. George on their upper garment; and as it appears from early writers that the upper dress of a horseman, and, according to others, a coat of mail, was called "a Jack," it admits of the inference that a small flag containing the cross in question was termed "a Jack," when used at sea, after the banner, which more properly speaking is confined to the field, fell into comparative disuse. The former of these conjectures appears, however, the more probable.—Sir Harris Nicholas; *Naval and Military Mag.* 1827.

NATIONAL FLAGS AND SIGNALS.

Red, white, yellow, and blue, are found to be the most conspicuous colors. The present French red, white, and blue is a good example of conspicuous effect produced by the simplest possible combination of the three colors in the same flag. The royal standard of Great Britain has a groundwork in some parts red and in others blue, with yellow or golden lions, and harps, and so forth. The Admiralty flag has a yellow anchor on a red ground. The English Union flag has a blue ground, red rectangular stripes, and white diagonals. The red and blue admiral's flags are plain. Many of the other English flags have a plain ground color over five-sixths of the surface, but with a cross of stripes in one corner. So it is throughout most of the nations of Europe. The colors on the naval flags are generally red, white (or yellow), and blue. Even his holiness the Pope has one flag with a white lamb and a white cross on a red ground; and another with a yellow St. Peter on a red ground. King Bomba (of Naples) has a yellow griffin on a white ground. Hamburgh has a white castle on a red ground. Venice has an amiable-looking yellow lion on a red ground, holding a yellow sword in one paw, and a white book in another. Bremen has a sort of red and white chessboard, with six times nine squares instead of eight times eight; and so on. Every where we find, red, white, and blue, or red, yellow, and blue; and we may be certain that something better than mere freak determines the selection of such colors as signals.—Abridged from Dickens' *Household Words*.

THE TURKISH CRESCENT.

Finlay remarks that the omission of the crescent in Saracenic or Mohammedan work generally is worth notice. It now crowns the

great mosques of Constantinople, but it is not to be found in any early work, and it appears to be itself simply the trophy of the conquest of the Greek capital of Constantinople, the ancient Byzantium, of which it was the symbol, the town on one occasion having, according to an old tradition, been preserved from a night ambuscade by the timely appearance of the new moon. One account says that this incident occurred when an attack was made on Byzantium by Philip of Macedon. The crescent then became a favorite badge of the city. At any rate it occurs on old Byzantine coins often with a star within its horns. Constantinople was captured by the Turks in 1453, and it is supposed that finding the crescent in every public place, they believed it to possess some peculiar power and so retained it. On the other hand, a correspondent of *Notes and Queries* considers that from various authorities which he quotes we are warranted by Turkish history and tradition in inferring—1. That the crescent has been for several centuries a public symbol of the religion and authority of the Othman (or Ottoman) empire. 2. That it was in use as part of the standard of the Janizaries nearly a century before the taking of Constantinople by Mahomed II. 3. That it was given by the founder of Mohammedanism as a symbol to his followers, in commemoration of some unusual natural phenomenon which had more the appearance of miracle than any other event to which he could appeal in confirmation of his prophetic mission.

Again it is related of the Sultan Othman, that he saw in a vision a half-moon, which kept increasing enormously, till its rays extended from the east to the west, and that this led him to adopt the crescent upon his standards, with this motto—*Donec repleat orbem.*

WHY IS THE IRIS CALLED THE FLEUR-DE-LYS?

Because the upper part of one leaf of the three-petaled iris, when fully expanded, and the two contiguous leaves, seen in profile, have a faint likeness to the top of the *Flower-de-Luce*, which often appears on the crowns and sceptres in the monuments of the first and second race of the kings of France, and which was probably a composition of these three leaves. Louis VII., engaged in the second crusade, distinguished himself, as was customary in those times, by a particular blazon, and took this figure for his coat of arms; and as the common people generally contracted the name of Louis into Luce, it is natural to imagine that this flower was, by corruption, distinguished in process of time by the name of Flower-de-Luce. But some antiquaries are of opinion that the original arms of the Franks being three toads, became odious, and

were gradually changed, so as to have no positive resemblance to any natural objects, and named Fleur-de-Lys.

THE DOLLAR MARK, $.

Writers are not agreed as to the derivation of this sign to represent dollars. Some say that it comes from the letters U. S. which after the adoption of the Federal Constitution, were prefixed to the Federal currency, and which afterwards in the hurry of writing were run into one another, the U. being made first and the S. over it. Others say that it is derived from the contraction of the Spanish word *pesos* dollars; others from the Spanish *fuertes*, hard, to distinguish silver from paper money. The more probable explanation is, that it is a modification of the figure 8, and denotes a piece of eight reals, or, as the dollar was formerly called, a *piece of eight*. It was then designated by the figures, 8/8.—*Dictionary of Americanisms.*

THE CENT.

The cent was proposed in 1782 by Robert Morris, the great financier of the Revolution, and was named by Jefferson, two years later. It began to make its appearance from the mint in 1792. It bore then the head of Washington on one side, and a chain of thirteen links on the other. The French revolution soon after created a rage for French ideas in America, which put on the cent, instead of the head of Washington, the head of the goddess of liberty—a French liberty with neck thrust forward and flowing locks. The chain on the reverse was replaced by the olive wreath of peace. But the French liberty was short-lived, and so was her portrait on our cent. The present staid classic dame, with a fillet round her hair, came into fashion about thirty or forty years ago, and her finely chiselled Grecian features have been but slightly altered by the lapse of time.

Previous to the adoption of our Federal currency, pounds, shillings and pence were used. But this currency became unstable in consequence of the great depreciation which took place in the paper money issued by the colonies. In 1702, exchange on England was 33⅓ per cent above par, and silver and gold bore the same relative value to paper money. The depreciation in the latter continually increased till in 1749 £1100 currency was only equal to £100 sterling. In 1750 a stop was put to the further depreciation of the money of Massachusetts by a remittance from England of £183,000 sterling in Spanish dollars to reimburse the expenses of the province in the reduction of Cape

Breton. The depreciated money was then called in and paid off at the rate of a Spanish dollar for 45 shilings of the paper currency. At the same time a law was made fixing the par of exchange between England and Massachusetts at £133⅓ currency for £100 sterling, and 6 shillings to the Spanish dollar. The difference of exchange, or depreciation of the paper money regulated in the same manner the currencies of the other colonies. Throughout New England it was 6*s.* to the dollar of 4*s.* 6*d.* sterling. In New York 8*s.* or about 75 per cent depreciation. Pennsylvania 7*s.* 6*d.* It is in consequence of this diversity in the colonial currencies that in New England the Spanish real of ⅛ of a dollar is called *ninepence ;* in New York *one shilling ;* in Pennsylvania, *elevenpence* or a *levy.*—BARTLETT.

THE EARLIEST COINED MONEY

Throughout the early parts of Scripture, as well as through the poems of Homer, not a single passage occurs from which we can infer either the use or the existence of stamped money. It is now agreed that the Egyptians had no coined money. Herodotus states the Lydians to have been the first people who coined gold and silver. The Parian Chronicle, however, ascribes the first coinage of copper and silver money to Pheidon, king of Argos, 895 B. C., in Ægina, which Ælian corroborates; and our best numismatic antiquaries agree in considering the coins of Ægina, from their archaic form and appearance, as the most ancient known. They are of silver, and bear on the upper side the figure of a turtle, and on the under an indented mark.

Pheidon also first established a scale of weights and measures, which M. Boeckh considers to have been borrowed immediately from the Phœnicians, and by them originally from the Babylonians, the common origin being the Chaldæan priesthood.

Coins are among the most certain evidences of history. In the later part of the Greek series they illustrate the chronology of reigns. In the Roman series, they fix the dates and succession of events. Gibbon observes, that if all our historians were lost, medals, inscriptions, and other monuments, would be sufficient to record the travels of Hadrian. The reign of Probus might be written from his coins.

THE STAR-CHAMBER.

The origin of the name "Star-Chamber" has been much disputed; but the most satisfactory explanation appears to be that given by Mr.

Caley, in the *Archæologia*, vol. viii. p. 404, namely, from the ceiling of the chamber being anciently ornamented with gilded stars.* The occupation of the "Chambre des Estoyers" or "Estoilles," by the king's council, in the palace at Westminster, can be traced to the reign of Edward III.; but no specific mention of the Star-Chamber *as a court of justice* can be found, Mr. Bruce believes, earlier than the reign of Henry VII., about which time the old titles of "the Lords sitting in the Star-Chamber," seem to have merged in this one distinguishing appellation.† After the sittings, the lords dined in the inner Star-Chamber at the public expense. The mode of the proceedings before the council was twofold: one, *ore tenus*, or by the mouth; the other, by bill and answer. The proceeding *ore tenus*, usually adopted in political cases, originated in "soden reporte," which Mr. Bruce thinks means private and probably secret information given to the council. The person accused or suspected was immediately apprehended, and privately examined. If he confessed any offence, or if the cunning of his examiners drew from him, or his own simplicity let fall, any expressions which suited their purpose, he was at once brought to the bar, his confession or examination was read, he was convicted *ex ore suo* (out of his own mouth), and judgment was immediately pronounced against him. Imagination can scarcely picture a more terrible judicature. This tribunal was bound by no law, but created and defined the offences it punished; the judges were in point of fact the prosecutors; and every mixture of those two characters is inconsistent with impartial justice. Crimes of the greatest magnitude were treated of in this court; but solely punished as trespasses, the council not having dared to usurp the power of inflicting death. Among the many abuses of the process was, that in the time of Queen Elizabeth, "many solicitors who lived in Wales, Cornwall, or the farthest parts of the north, did make a trade to sue forth a multitude of subpœnas to vex their neighbors, who, rather than they would travel to London, would give them any composition, though there were no color of complaint against them." The process might anciently be served in any place: in Roman Catholic times it was usually served in the market or church. The highest number of the council who attended the court in the reigns of Henry VII. and VIII. was nearly forty, of whom

* Barrington refers it to Stor, or Storrum, a Jewish term in ancient contracts.

† The judges, before and subsequent to this alteration, were the same, viz., the members of the king's ordinary council,—"the Lords of the Council," as they are still termed in the Litany of the Church service, although many of them have generally been under the degree of a Baron.

seven or eight were prelates; in the reign of Elizabeth the number was nearly thirty, but it subsequently declined. The Chancellor was the supreme judge, and alone sat with his head uncovered. Upon important occasions, persons who wished "to get convenient places and standing" went there by three o'clock in the morning. The counsel were confined to a "laconical brevity;" the examinations of the witnesses were read, and the members of the court delivered their opinions in order from the inferior upwards, the Archbishop preceding the Chancellor. Every punishment, except death, was assumed to be within the power of the Star-Chamber Court. Pillory, fine and imprisonment, and whipping, wearing of papers through Westminster Hall, and letters "seared in the face with hote irons," were ordinary punishments.

Henry VII. had a fondness for sitting in the Star-Chamber: the court was the great instrument for his "extort doynge;" and "the king took the matter into his own hands," was a Star-Chamber phrase; and "my attorney must speak to you," was a sure prelude to a heavy fine. Wolsey made a great show of his magnificence in the Star-Chamber: he proceeded to the sittings of the court in great state, his mace and seal being carried before him; "he spared neither high nor low, but judged every estate according to their merits and deserts." After his fall, with the exception of occasional interference in religious matters and matters of police, we seldom hear of the Star-Chamber. (See the very able dissertation by John Bruce, F. S. A., *Archæologia*, vol. viii. pp. 342–392.)

The Star-Chamber held its sittings, from the end of Queen Elizabeth's reign until the final abolition of the court by Parliament in 1641, in apartments on the eastern side of New Palace Yard; these buildings bore the date 1602, and E. R. and an open rose on a star; they corresponded with the "Starre-Chamber" in Aggas's plan of London in 1570. The last of the buildings was taken down in 1836; drawings were then made of the court, which had an enriched ceiling, but no remains of the *star* ornamentations, notwithstanding, behind the Elizabethan panelling, the style of the chamber was Tudor Gothic. The remains are preserved at Leasowe Castle, the seat of the Hon. Sir Edward Cust, in Shropshire.

ANTIQUITY OF TARRING AND FEATHERING.

Tarring and feathering, it seems, is a European invention. One of Richard Cœur-de-Lion's ordinances for seamen was, "that if any

man were taken with theft or pickery, and thereof convicted, he should have his head polled, and hot pitch poured upon his pate, and upon that the feathers of some pillow or cushion shaken aloft, that he might thereby be known for a thief, and at the next arrival of the ships to any land be put forth of the company to seek his adventures without all hope of return unto his fellows."—HOLINSHED.

THE GARROTE.

This is the mode of execution in use among most of the Spanish nations of America. It is thus described in a Jamaica journal, detailing the execution of General Lopez at Havana, Sept. 1, 1851:

"The prisoner is made to sit in a kind of chair with a high back, to which his head is fastened by means of an iron clasp, which encloses his neck, and is attached to the back by a screw. When the signal is given, the screw is turned several times, which strangles the victim, and breaks his neck." It is sometimes spoken of as a barbarous mode of execution, but as it never fails and is instantaneous, there is perhaps reason to doubt the correctness of the epithet.

THE GUILLOTINE.

The guillotine consists simply of two upright posts, surmounted by a cross-beam, and grooved for the purpose of guiding an oblique-edged knife, the back of which is heavily weighted to make it fall swiftly and with force, when the cord by which it is held aloft is let go. Though, as is generally known, it takes its name from Joseph Ignace Guillotin, a physician of Paris, who carried its adoption in the French National Assembly on March 20, 1792; yet it is an error to suppose that he was the inventor, for it had been in use in many parts of Germany, in England, Scotland, and Italy, centuries before his day. In fact Guillotin had nothing more to do with it than to bring it to the notice of the Assembly. The real mover in the affair was the famous surgeon Antoine Louis, but his designs would never have been carried out but for the mechanical ingenuity of a young German, named Schmidt, then residing in Paris. The first execution with the new machine took place at Paris, April 25, 1792. It is an error to suppose that Guillotin was the first victim of the new instrument. It is true that he was imprisoned, and nearly fell a victim to the carnage of the revolution; but he escaped, and after the termination of his political career, resumed the functions of a physician, and became one of the founders of the Academy of Medicine at Paris. He died May 26, 1814,

aged 76, after enjoying, up to his last moments, the esteem of all who knew him. One of the earliest pictorial representations of the guillotine, dating from a period considerably antecedent to the French revolution, pictures the machine, with a sort of prophetic bitterness, as worked by a devil.

THE CHRISTIAN ERA.

The Christian Era was first used about the year 527 by Dionisius, surnamed "Exiguus," but better known as Denys le Petit, a monk of Scythia and a Roman abbot, in consequence of which it is sometimes called "Recapitulatio Dionisii." It was not introduced into Italy until the sixth century, and, though first used in France in the seventh, it was not universally established there till about the eighth century. An instance of the use of the Christian era in England is supposed to have occurred as early as the year 680; it was generally adopted in the eighth century, and it was ordained by the Council of Chelsea, in July, 816, that all bishops should date their acts from the year of the incarnation of our Saviour. In Spain, the Christian era, though occasionally adopted in the eleventh, was not uniformly used in public instruments until after the middle of the fourteenth century, nor in Portugal until about the year 1415. In the Eastern Empire and in Greece, it was not universal until after the capture of Constantinople by Mahomet II. in 1453.

The years of the Christian era are described in ancient documents as the years "of Grace," of "the Incarnation," of "our Lord," of "the Nativity," of "the Circumcision," and "annus Trabeationis."—Sir Harris Nicholas's *Chronology of History.*

THE INSTITUTES OF JUSTINIAN.

In the Biblioteca Capitolare at Verona many of the manuscripts are palimpsests, and one of them furnished the "Institutes of Caius," compiled in the reign of Caracalla. It was known that this treatise was the foundation of the "Institutes of Justinian," but not a fragment of it could be found.

A rumor devoid of credence has been propagated by the enemies of Justinian, that the Jurisprudence of ancient Rome was reduced to ashes by the author of the Pandects, from the vain persuasion that it was now either false or superfluous. Without usurping an office so invidious, the emperor might safely commit to ignorance and time the accomplishment of this destructive wish. Before the invention of printing and paper, the labor and the materials of writing could be

purchased only by the rich; and it may reasonably be computed that the price of books was a hundredfold their present value. Copies were slowly multiplied, and cautiously renewed; the hopes of profit tempted sacrilegious scribes to erase the characters of antiquity; and Sophocles or Tacitus was compelled to resign the parchment to missals, homilies, and the golden legend. If such was the fate of the most beautiful compositions of genius, what stability could be expected from the dull and barren works of an obsolete science?—GIBBON.

Years after the death of Gibbon, this sagacity was verified by the zeal of Niebuhr, who, on his way to Rome in 1816, examined the capitular library at Verona. Two small fragments, relating to jurisprudence, not palimpsests, had been published by Maffei. But he had not ascertained their author. Niebuhr suspected that they were parts of the Institutes of Caius, and upon further examination he discovered the whole remainder, or nearly so, of this ancient text-book of the Roman law, palimpsested, beneath the homilies of St. Jerome, literally verifying Gibbon's words.

The veracity of Justinian, in his Institutes, has been impeached, for, says Lord Mahon, "we find him boasting of the warlike fatigues he had borne, and we can hardly suppress a smile on recollecting that this prince, so weary with laborious campaigns, had never quitted his palace at Constantinople, unless for the villas in its neighborhood."

INTRODUCTION OF THE GREGORIAN CALENDAR.

The Gregorian Calendar, establishing the "New Style," as it is commonly called in reckoning time, was adopted at Rome, in parts of Italy, and in Spain and Portugal, on Oct. 13, 1582; in France, on Dec. 20, and in Holland and Flanders, Dec. 15, in the same year, though owing to troubles in some provinces, it was not fully introduced in the Low Countries till the year 1700. In Germany the Catholics adopted the Gregorian Calendar in 1584, the Protestants retaining the old, and it was not till Nov. 15, 1699, that the old calendar was universally abandoned within the empire. In most of Switzerland, the Gregorian Calendar was adopted in 1583 or 1584, though some of the Protestant cantons did not adopt it till 1701. In Hungary, the new calendar was introduced in 1587, in Poland in 1586, in Sweden, March 1, 1753, in Denmark in 1582, while in Russia and Greece, it has never been adopted. In England, the Julian or old style and the practice of commencing the Legal year on March 25, continued till 1751, when an act was passed providing for the introduction of the

Gregorian Calendar, on Jan. 1, 1752. The Historical year had long commenced on Jan. 1.

It should be remarked that in Germany, Switzerland, and Denmark it is not, strictly speaking, the Gregorian Calendar which is in use, but one formed by a celebrated mathematician, named Weigel, which only differs from the Gregorian in its mode of fixing Easter and the movable Feasts; so that it has sometimes happened that the Protestants and Catholics celebrated that feast on a different day.—SIR HARRIS NICHOLAS'S *Chronology of History.*

FRENCH REVOLUTIONARY CALENDAR.

In September, 1793, the French nation resolved that the Republic should form a new era, and that a calendar should be adopted on, what were termed, philosophical principles. The Convention, therefore, decreed, on Nov. 24, 1793, that the common era should be abolished in all civil affairs; that the new French era should commence from the foundation of the Republic, namely, on Sept. 22, 1792, on the day of the true autumnal equinox, when the Sun entered Libra at 9h. 18′ 30″ in the morning, according to the meridian of Paris; that each year should begin on the midnight of the day on which the true autumnal equinox falls; and that the first year of the French Republic had begun on the midnight of Sept. 22, and terminated at midnight between Sept. 21 and 22, 1793. To produce a correspondence between the seasons and the civil year, it was decreed, that the fourth year of the Republic should be the first sextile or leap-year; that a sixth complementary day should be added to it, and that it should terminate the first "Franciade;" that the sextile or leap-year, which they called an Olympic year, should take place every four years, and should mark the close of each Franciade; that the first, second, and third centurial years, viz. 100, 200, and 300, of the Republic should be common, and that the fourth centurial year, viz. 400, should be sextile; and that this should be the case every fourth century until the 40th, which should terminate with a common year. The year was divided into twelve months of thirty days each, with five additional days at the end, which were celebrated as festivals, and which obtained the absurd name of "Sansculottides." The months and festivals were as follows:—

Autumn	Vindémiaire (Vintage Month), . . .	Sept. 22 to Oct. 21.
	Brumaire (Foggy Month), ...	Oct. 22 to Nov. 20.
	Frimaire (Sleety Month), ...	Nov. 21 to Dec. 20.

Winter	Nivose (Snowy Month), ...	Dec. 21 to Jan. 19.
	Pluviose (Rainy Month), ...	Jan. 20 to Feb. 18.
	Ventose (Windy Month), ...	Feb. 19 to Mar. 20.
Spring	Germinal (Budding Month), . . .	Mar. 21 to Apr. 19.
	Floreal (Flowery Month), ...	Apl. 20 to May. 19.
	Prairial (Pasture Month), ...	May. 20 to June 18.
Summer	Messidor (Harvest Month), ...	June 19 to July 18.
	Fervidor, or Thermidor (Hot Month),	July 19 to Aug. 17.
	Fructidor (Fruit Month),	Aug. 18 to Sept. 16.

To complete the 365 days of the common year, five "Jours Complementaires," which were considered as festivals, were added; viz.—

Primidi,	dedicated to	Virtue,	September 17.
Duodi,	" "	Genius,	September 18.
Tridi,	" "	Labor,	September 19.
Quartidi,	" "	Opinion,	September 20.
Quintidi,	" "	Rewards,	September 21.

In Olympic or Sextile years, a sixth complementary day occurred, called—

Sextidi, or "Jour de la Révolution," on which the national oath, "to live free or die," was to be renewed.

Instead of months being divided into weeks, they consisted of three parts, called Decades, of ten days each; and the nine days between them were called the 1st, 2d, 3d, &c. before or after Decadi; thus:—

Primidi,	Quartidi,	Septidi,
Duodi,	Quintidi,	Octodi,
Tridi,	Sextidi,	Nonidi,

The division of each month was as follows:—

Day of the Month.		*Day of the Month.*		*Day of the Month.*	
1. Primidi,	*Before Decadi.*	11. Primidi,	*After Decadi I.*	21. Primidi,	*After Decadi II.*
2. Duodi,		12. Duodi,		22. Duodi,	
3. Tridi,		13. Tridi,		23. Tridi,	
4. Quartidi,		14. Quartidi,		24. Quartidi.	
5. Quintidi,		15. Quintidi,		25. Quintidi,	
6. Sextidi,		16. Sextidi,		26. Sextidi,	
7. Septidi		17. Septidi,		27. Septidi,	
8. Octodi,		18. Octodi,		28. Octodi,	
9. Nonidi,		19. Nonidi.		29. Nonidi.	
10. Decadi I.		**20. Decadi II.**		**30. Decadi. III.**	

It is, however, to be observed, that the French Republicans rarely adopted the Decades in dating their letters, or in conversation, but used the numbers of the day of each month of their Calendar. For example: 1, 2, 6, 11, 15, 16, 17, 20, 25, 28, or 30, Nivose; the 9th Fructidor; the 12th Germinal; the 16th Frimaire; the 23d Prairial,

&c. The Republican Calendar was first used on Nov. 26, 1793, and was discontinued on Dec. 31, 1805, when the Gregorian was resumed. —SIR HARRIS NICHOLAS's *Chronology of History.*

CANONICAL HOURS.

The Catholic Church divided the twenty-four hours into seven parts, termed Matins or Lauds, Prime, Tierce, Sext, Nones, Vespers, and Completorium or Complin, to each of which proper services were assigned. These divisions, together with others called watches, were generally used by ecclesiastics, instead of the usual hours of the day. The following is an explanation of them. Matins or Matutina or Lauds, from midnight until Prime. The morning service commenced about 3 A. M. and was called Matins, or Lauds. Prime or Prima from 6 A. M. until Tierce. This service immediately succeeded Matins. Tierce or Tertia from about 9 A. M. to Sext. Sext, or Sexta, from about 12, or noon, to Nones. Nones or Nona from about 2 or 3 P. M. to Vespers. Vespers or Vespera from about 4 o'clock to Complin, or second Vespers. Completorium or Complin, second Vespers, about 7 o'clock.—SIR HARRIS NICHOLAS's *Chronology of History.*

HISTORICAL AND LEGAL YEARS.

The fact that down to 1752 the Historical year in England commenced on Jan. 1, while the Civil, Ecclesiastical and Legal year commenced on March 25, led to much confusion in dates, as the Legislature, the Church and civilians referred every event which happened between Jan. 1 and March 25 to a different year from the Historians.

Remarkable examples of the confusion produced by these two modes of computing dates are afforded by two of the most celebrated events in English history. King Charles I. is said by most authorities to have been beheaded on the 30th of January, 1648; whilst others, with equal correctness, assign that event to the 30th of January, 1649. The Revolution which drove James II. from the throne is stated by some writers to have taken place in February, 1688; whilst according to others, it happened in February, 1689. These discrepancies arise from some historians using the *Civil and Legal*, and others the *Historical Year;* though both would have assigned any circumstance after the 25th of March to the same years, namely 1649 and 1689.

To avoid, as far as possible, the mistakes which this custom produced, it was usual to add the date of the *Historical* to that of the *Legal Year*, when speaking of any day between the 1st of January and the 25th of March; thus:

Jan. 30, 164$\frac{8}{9}$ $\begin{cases} \textit{i. e.}\ 1648, \text{ the Civil and Legal year.} \\ \textit{i. e.}\ 1649, \text{ the Historical year.} \end{cases}$

Or thus:

January 30, 1648-9.

This practice, common as it has long been is nevertheless frequently misunderstood; and even intelligent persons are sometimes perplexed by dates being so written. The explanation is, however, perfectly simple; for the *lower* or *last figure* always indicates the year according to our present calculation.—SIR HARRIS NICHOLAS.

LENGTH OF REIGNS.

The number of monarchs or supreme governors who succeed each other in any given number of years, must of course depend upon the mode of choosing them in different nations. Where the government is elective and the Sovereign is occasionally removed by assassination or deposition, no certain rule can be formed for the average length of any number of reigns: but it was considered by Newton, that allowing for all contingencies, kings reign, one with another, about eighteen or twenty years each; and that the proportion of mean reigns to mean generations is as 19 to 33⅓ or as 4 to 7; thus reckoning generations nearly double the length of reigns. Dr. Hales, however, has shown that the average standard of reigns is 22⅓ years to a reign, in a series of 454 kings in 10,105 years, which will give the proportions of generations to reigns, as 33⅓ to 22⅓, or as nearly 3 to 2. In forming this calculation, Dr. Hales includes, 1, the Egyptian, and 2, the Athenian kings; 3, the kings of Argos, Lydia, &c.; 4, the eighteen kings of Judah; 5, the kings of England from the Conquest to 1760; 6, the kings of Scotland from Malcolm I., A. D. 938 to the death of James I. of England; 7, the kings of France from 987 to 1793: 8, the kings of Spain from 1027 to 1788; 9, the emperors of Germany from Charlemagne, in 800, to 1792; and 10, the reigns of 142 sovereigns in Hindostan; but it may be useful to separate the European monarchs from the others, and taking the reigns of five European sovereigns, to calculate the average duration of each. England.—From the accession of William I., 1066, to the death of William IV., 1837, a period of 771 years, there have been 34 kings, who reigned, on the average, a little more than 23½ years each. Scotland.—From the accession of Malcolm I. in 938 to the death of James I. (or VI. of England) in 1625, a period of 687 years, there were 33 kings, who reigned, on the average, nearly 21 years each. France.—From Hugh Capet, 987, to the death of Louis XVI. in 1793, a period of 806 years, there were 32 kings, who reigned 20 years

each. Spain.—From Ferdinand the Great, 1027, to the abdication of Charles the 4th, in 1088, a period of 781 years, there were 33 kings, who reigned, on the average, nearly 24 years each. Germany.—From Charlemagne, 800, to the death of Leopold I. in 1792, a period of 992 years, there were 55 emperors, who reigned, on the average, 18 years each. If the years 1060 to 1830 be fixed upon as the epochs from which to reckon the number of sovereigns of England, Scotland,* France, Spain, and Germany, it will appear that, in a period of 764 years, there were 172 sovereigns, being, on the average, 34 in each of those countries, who reigned about 22½ years each. The most rapid succession of sovereign princes whose reigns usually terminate with their deaths is, as might be expected from the advanced age at which they usually attain their dignity, that of the Roman Pontiffs. From the year 1000 to the accession of the present pope, a period of 828 years, there have been 111 pontiffs, exclusive of the anti-popes. This gives to each pope a reign of 7½ years; but if the time during which the Holy See was vacant, in the above period, be reckoned, and which cannot be computed altogether at less than twelve years (without including the few days that necessarily elapsed between the death of one pope and the election of his successor), their reigns will scarcely average 7¼ years.—Sir Harris Nicholas's *Chronology of History*.

ERROR IN ENGLISH CHRONOLOGY.

From the reign of John to that of Edward VI. the several reigns did not commence until some act of sovereignty was performed by the new monarch (generally the "proclamation of his peace), or until he was publicly recognized by his subjects. In the case of the first eight kings after the Conquest their reigns did not begin until the coronation. Consequently sometimes several days or weeks elapsed between the acquisition of the inchoate right by the death or deposition of the former sovereign and the perfection of that right in the manner described. Ignorance or forgetfulness of this fact has lead to errors in every table of the regnal years of the English sovereigns that has been printed.—Sir Harris Nicholas's *Chronology of History*.

THE FIRST BAIL IN ROME.

The first instance in which Bail was offered and accepted in the

* In this calculation, all the kings of England since James I. of England (or VI. of Scotland), are included among the kings of Scotland: and the kings of France have been reckoned as if the House of Bourbon had always been, de facto, kings since 1793.

7*

annals of the Republic was in the case of Cæso, the son of Cincinnatus, accused of having murdered the brother of Volicius in a drunken frolic; when Cæso, considering himself prejudged, fled into Etruria, and thus *forfeited his recognizances.*

NUMBER AND DIVISIONS OF THE ENGLISH NOBILITY.

In England the existing dukes, marquises and viscounts, amount each to nearly the same number. In Scotland the viscounts equal the dukes in number, but the latter are nearly double the marquises. In Ireland there is but one duke. In England the marquises furnish the fewest to the peerage of any rank in the nobility, as is also the case in Scotland, but in Ireland, there being but one dukedom, the title of marquis is more frequently met with. The reign of George III. supplied the peerage with almost the whole of the existing marquisates, ten having been created in England where there remained but one, and nine in Ireland where previously none had existed. In England there are twice as many barons as earls, but the two together form fully three fourths of the whole peerage. In Scotland the proportion is reversed, for there are twice as many earls as barons, and the two combined form more than three fourths of the peerage. In Ireland the number is nearly alike, but there also the two constitute three fourths of the peerage. Viscounts in England and Scotland are much fewer in number than in Ireland. Of the existing baronetage, Scotland furnishes but one sixth and Ireland about one seventh.

Numerous as the nobility of Great Britain is, yet the entire aggregate does not comprehend more than half so many individuals as are included under the head of those enjoying titles "by courtesy," those bearing titles by right not much exceeding two thousand, while there are upwards of four thousand persons who enjoy titular distinctions of which usage is the only foundation and courtesy the only authority, which are never granted them in legal documents or in the official publications of the government, unless perhaps preceded by the qualification "commonly called." The persons of whom this is true are the sons, daughters, and, in some cases grandchildren of peers and peeresses.—Dod's *Manual of Dignities.*

FEMALE SUCCESSION TO THE THRONE OF ENGLAND.

This principle seems to have been indigenous in Britain. Tacitus mentions it as a peculiarity of this nation—"*neque sexum in imperiis discernunt;*" and it is clear that the British crown was in those days inheritable by females. The exclusion of females from the throne of

France by what is called the Salic law, is admitted to have been a special departure from a general rule. But our English annals afford a curious and lamentable anomaly on the subject; for, while the *principle* of female succession has never been denied, it has so happened in *practice*, that from the Conquest to the accession of Mary I. —nearly five hundred years—there is not a single instance in which the female heir was not violently deprived of her regal rights, and generally by the next heir male. Matilda, the only surviving child of Henry I., was dispossessed by Stephen, and after his death passed over by her own son. Philippa of Clarence and her issue, heirs to the crown on the death of Richard II., were excluded by the usurpation of the next male, Henry IV. and his descendants, which produced those bloody and protracted struggles called, somewhat inaccurately, the contest of the Houses of *York* and Lancaster; for the Duke of York's only title was as the son of Anne, the daughter of Philippa of *Clarence*. Elizabeth, only surviving child of Edward IV., was set aside, first by the next male, her uncle, Richard III.; and subsequently by Henry VII., who, though he was glad to repair his own illegitimate title by a union with her, never acknowledged her separate rights, and affected to transmit the crown to their son, Henry VIII., as the heir of the *Lancastrian* branch, though his real right was as the descendant, through three females and two males, of Lionel of *Clarence*. Fortunately for England, there existed, at the death of Edward VI., no one that could advance any claim to the crown to the exclusion of heirs female; and in the person of Mary was the first time brought into *practice* a principle which was coeval with the monarchy; and the first step being thus made, the vigor, glory, and duration of Elizabeth's reign may be said to have first consecrated the ancient theory of the constitution.—*Quarterly Review*, 1837.

SUCCESSION TO THE THRONE OF FRANCE.

Not a little remarkable is it to observe, that from the accession of Louis XIV. to the present time not a single king or governor of France,—though none of them, with the exception of Louis XVIII., have been childless,—has been succeeded at his demise by his son. Louis XIV. survived his son, his grandson, and several of his great-grandchildren, and was succeeded at last by one of the younger children of his grandson, the Duke of Burgundy. Louis XV. survived his son, and was succeeded by his grandson. Louis XVI. left a son behind him; but that son perished in the filthy dungeon to which the

cruelties of the terrorists had confined him. The King of Rome, to whom Napoleon fondly hoped to bequeath the boundless empire he had won, died a colonel in the Austrian service. Louis XVIII. was, as we have said, childless. The Duke de Berri fell by the hand of an assassin in the lifetime of Charles X.; and his son, the Duke de Bordeaux, is in exile from the land which his ancestors regarded as their own estate. The eldest son of Louis Philippe perished by an untimely accident; and his grandson and heir does not sit upon the throne of his grandfather. Thus, then, it appears that for upwards of two hundred years in no one of the dynasties to which France has been subjected has the son succeeded to the throne of the father.—*The Times Journal*, 1856.

THE DAUPHIN OF FRANCE

Was the title given to the eldest son of the king of France under the Valois and Bourbon dynasties. The Counts of Albon and Grenoble assumed the title of Counts of Vienne, of whom Guy VIII. is said to have been surnamed Le Dauphin, because he wore a dolphin as an emblem on his helmet or shield. The surname remained to his descendants, who were styled Dauphins, and the country which they governed was called Dauphiné. Humber II., de la Tour de Pisa, the last of the Dauphin dynasty, gave up his sovereignty by treaty to King Philippe de Valois in 1349.—(*Moreri*, &c.) From that time the eldest son of the King of France has been styled Dauphin, in the same manner as the eldest son of the Queen of England is styled Prince of Wales. Since the dethronement of the elder branch of the Bourbons in 1830, the title of Dauphin has been disused. The last who bore it was the Duke of Angoulême, son of Charles X.

CHARLES MARTEL.

The great battle of Tours, which was to decide whether Europe should remain Christian or the Cross sink under the Crescent, was fought in October, 732, between the Saracens under Abderahman, and the Franks under Charles Martel; when the triumph of the latter terminated the course of Arab conquest. "Then was Charles first called by the name of Martel (*a sort of battle-axe*); for as the martel crushes iron, steel, and all other metals, even so he broke and pounded his enemies and all other nations."—*Chroniques de St. Denys*, lib. XV. 26.

ANTIQUITY OF SOAP.

The word Soap or Sope, from the Greek *sapa*, first occurs in the works of Pliny and Galen. Pliny states soap to have been discovered by the Gauls, that it was composed of tallow and ashes, and that the German soap was reckoned the best. According to Sismondi a soap-maker was included in the retinue of Charlemagne. At Pompeii (overwhelmed by an eruption of Vesuvius, A.D. 79), a soap-boiler's shop, with soap in it, was discovered during an excavation made there not many years ago.—(*Starke's Letters from Italy.*) Hence the manufacture of soap is of very ancient origin; indeed Jeremiah figuratively mentions it—"For though thou wash thee with natron, and take thee much sope, yet thine iniquity is marked before me." (Jer. ii. 22.)

ANTIQUITY OF PERFUMES.

Pliny describes a mixture of dried flowers and spices, corresponding with the *pot-pourri*, of the modern perfumer.* Frangipani Powder (spices, orris-root, and musk or civet) was invented by one of the earliest of the Roman nobles named Frangipani.† The Egyptian ladies carried a little pouch of odoriferous gums, as the Chinese do to the present day. Several passages in Exodus prove the use of perfumes at a very early period among the Hebrews, as "sweet spices, stacte, onycha, and galbanum, with pure frankincense;" and the "bdellium" mentioned by Moses in Genesis is a perfuming gum resembling frankincense, if not identical with it. Perfumes were also mixed with the oil and wax for the lamps and lights commanded to be burned in the house of the Lord. Galen, the celebrated physician of Pergamos, who lived about 1700 years ago, invented the *ceratum Galeni*, the cold cream of the present day. In southern Italy so great was the trade in unguents and perfumes, that the unguentarii or perfumers are said to have filled the great street of ancient Capua.—Abridged from PIESSE's *Art of Perfumery*.

FINE CLARET.

A great proportion of the wine which is drunk under this denomi-

* Among the curiosities shown at Alnwick Castle, is a vase that was taken from an Egyptian catacomb. It is full of a mixture of gum, resins, &c., which evolve a pleasant odor to the present day, although probably 3000 years old.—*Piesse's Art of Perfumery*.

† Mutio Frangipani was an alchemist of some repute, who invented a stomachic which he named *ro-solis*, *ros-solis*, sun-dew. We owe the Frangipane tart to the same illustrious source.

nation is nothing but the *vin ordinaire*, or, at best, the secondary growths of Gascony and Guienne; for the prime growths fall far short of the demand which prevails for these wines, not only in this country, but in England, Holland, the north of Europe, and the East and West Indies. In favorable years, the produce of Lafitte, Latour, and Château Margaux, sells at from 3,000 to 3,200 francs the tun, which contains 242 gallons; and when they have been kept in the vaults for six years, the price is doubled; so that even in Bordeaux a bottle of the best wine cannot be purchased for less than six francs. There is, however, a particular manufacture, called *travail à l'Anglaise*, which consists in adding to each hogshead of Bordeaux wine three or four gallons of Alicant of Benicarlo, half a gallon of stum wine, and sometimes a small quantity of Hermitage. This mixture undergoes a slight degree of fermentation; and, when the whole is sufficiently fretted in, it is exported under the name of Claret.

RUSSIAN CIVILIZATION UNDER PETER THE GREAT.

It appears from the diary of General Patrick Gordon (Moscow 1849–1851), that as early as 1651 there was a public coach running for the conveyance of passengers from Königsberg near the present Russian frontier. In 1695, the same writer mentions that he gathered in Russia 8722 wagons for a campaign in the south, and at a somewhat earlier period we find that as many as twenty to thirty thousand wheeled vehicles could be assembled in that country for a campaign, and that bridges, pontoons, and boats sufficient for a large army on a march of many weeks through an uninhabited country, were constructed by the ordinary skill and industry of the people. In 1690 we find that regular post-office communications existed, and postages charged by weight were established not merely within the Russian empire but with foreign countries. The remittance of money by bills of exchange was perfectly understood, and in common use. These and other facts incidentally mentioned in the above work, show that there must be much of error and exaggeration in the commonly received idea of the barbarous state of Russia at that period, the age of Peter the Great. On the contrary, it would seem that Russia must have then been as far advanced as Scotland, Ireland, or Germany, to say the least, in some of the useful arts, and in the institutions which promote and testify civilization. At any rate, it was not all blank barbarism.

THE ZOLL-VEREIN,

Or Customs' Union, is a union of smaller states with Prussia for the purpose of customs' uniformity, first commenced in 1819, by the union of Schwarzburg-Sondershausen, and which now includes Prussia, Saxony, Bavaria, Wurtemberg, Baden, Hesse-Cassel, Brunswick, and Mecklenburg-Strelitz, and all intermediate principalities. For the purposes of trade and customs, these different kingdoms and principalities act as one empire. In 1855, Austria and the States of southern Germany formed a quasi connection with the Zoll-verein, giving them many of its advantages.

DEGENERATE ROMANS.

"Of all those illustrious men," says Lord Mahon, "who have formed the literature, or revived the arts, of modern Italy, not one has been a native of Rome; and nearly all have sprung from barbarian ancestry in the ancient Cisalpine Gaul. The soil, once so fertile in heroes, seems weary and exhausted with the number."—*Life of Belisarius.*

Guido was of Bologna, Davila of Padua, Tiraboschi of Bergamo, Correggio and Ariosto of Reggio, Bentivoglio of Ferrara, Maffei of Verona, Alfieri of Piedmont, Muratori of Modena, Raphael of Urbino. Fra Paola, Goldoni, Titian, and Canova, were Venetians; Petrarch, Guicciardini, Machiavel, Dante, Michael Angelo, and Boccacio, Florentines. Tasso was born at Sorrento, but his family was from the Milanese. Deduct these, and what remains for southern Italy?

YOUNG GENIUS.

Mr. Disraeli has, in his *Coningsby*, this striking page: "Genius, when young, is divine. Why, the greatest captains of ancient and modern times both conquered Italy at twenty-five! Youth, extreme youth, overthrew the Persian empire. Don John of Austria won Lepanto at twenty-five—the greatest battle of modern times; had it not been for the jealousy of Philip, the next year he would have been emperor of Mauritania. Gaston de Foix was only twenty-two when he stood a victor on the plain of Ravenna. Every one remembers Condé and Rocroy at the same age. Gustavus Adolphus died at thirty-eight. Look at his captains—that wonderful Duke of Weimar, only thirty-six when he died. Banèr himself, after all his miracles, died at forty-five. Cortes was little more than thirty when he gazed upon the golden cupolas of Mexico. When Maurice of Saxony died at thirty-two, all

Europe acknowledged the loss of the greatest captain and the profoundest statesman of the age. Then there is Nelson, Clive; but these are warriors, and perhaps you may think there are greater things than war. I do not. I worship the Lord of Hosts. But take the most illustrious achievements of civil prudence. Innocent III., the greatest of the popes, was the despot of Christendom at thirty-seven. John de Medici was a cardinal at fifteen, and, Guicciardini tells us, baffled with his craft Ferdinand of Aragon himself. He was pope as Leo X. at thirty-seven. Luther robbed even him of his richest province at thirty-five. Take Ignatius Loyola and John Wesley—they worked with young brains. Ignatius was only thirty when he made his pilgrimage and wrote the *Spiritual Exercises*. Pascal wrote a great work at sixteen (the greatest of Frenchmen), and died at thirty-seven. Ah, that fatal thirty-seven! which reminds me of Byron—greater even as a man than a writer. Was it experience that guided the pencil of Raphael when he painted the palaces of Rome? He died at thirty-seven. Richelieu was secretary of state at thirty-one. Well, then, there are Bolingbroke and Pitt, both ministers before other men leave off cricket. Grotius was in practice at seventeen, and attorney-general at twenty-four. And Acquaviva—Acquaviva was general of the Jesuits, ruled every cabinet in Europe, and colonized America, before he was thirty-seven. What a career! the secret sway of Europe! That was indeed a position! But it is needless to multiply instances. The history of heroes is the history of youth."

WHO WAS JUNIUS?

This vexed question has called forth no less than forty works in England, and about one fourth part that number in the United States.

The following persons, among others, have each, with great tenacity, been claimed as author of the celebrated letters, and the claims of quite a large number of them have been defended at great length: Edmund Burke, Horne Tooke, Hugh McAuly Boyd, Gen. Lee, Lord Chatham, Dr. Francis Glover, the author of Leonidas; John Lewis de Solme, LL.D., Advocate; Rev. James Wilmot, D.D.; the Duke of Portland, Sir Philip Francis; Gibbon, the historian; Suett, the comedian; the Earl of Chesterfield, Lord Viscount Sackville, Charles Lloyd, Esq.; Daniel Wray, Earl Temple, Sir Robert Rich, Governor Pownall.

BURIAL OF SIR JOHN MOORE.

It has been generally supposed that the burial of Sir John Moore,

who fell at the battle of Corunna in 1809, took place during the night, an error which doubtless arose from the statement to that effect in Wolfe's celebrated lines. Rev. Mr. Symons, who was the clergyman on the occasion, states, however, in Notes and Queries, that the burial took place in the morning, in broad daylight, and that it was hurried in consequence of the exposure to the balls of the enemy who discovered them.

INTRODUCTION OF THE POTATO.

The history of the Potato affords a strong illustration of the influence of authority. For more than two centuries the use of this invaluable plant was vehemently opposed; at last, Louis XV. wore a bunch of its flowers in the midst of his courtiers, and the consumption of the root became universal in France.

GYPSIES.

It seems now to be pretty generally agreed that this singular race originally came from India, whence they migrated at the time of the great Mohammedan invasion of Timor Bey. It is calculated that there are five million gypsies in Europe, Asia, and Africa. The number in America probably does not exceed, if it reaches, a hundred or two.

INVENTION OF CARDS.

The general opinion respecting the origin of Playing Cards is, that they were first made for the amusement of Charles VI. of France, at the time of his mental derangement, which commenced in 1392, and continued for several years. This supposition depends upon an entry in the account-book of the treasurer of the unhappy monarch, which states a payment of fifty-six sols of Paris to have been made to Jacquemin Gringonneur, painter, for three packs of cards, gilded, and painted with divers colors, and different devices, for the diversion of his majesty. Upon this statement, Strutt observes: "If it be granted —and I see no reason why it should not—that this entry alludes to playing-cards, the consequences that have been deduced from it do not necessarily follow. I mean that these cards were the first that were made, or that Gringonneur was the inventor of them; it by no means precludes the possibility of cards having been previously used in France, but simply states that those made by him were gilt and diversified with devices in variegated colors, the better to amuse the unfortunate monarch.

"Some, allowing that Gringonneur was the first maker of playing-cards, place the invention in the reign of Charles V., upon the authority of Jean de Saintre, who was page to that monarch, and who thus mentions card-playing in his chronicle: 'Et vous qui êtes noyseux, joueux de *cartes* et de dis,—And you who are contentious, players at *cards* and at dice.' This would be sufficient evidence" (adds Strutt) for the existence of cards before the accession of Charles VI. to the throne of France, if it could be proved that the page did not survive his master; but, on the other hand, if he did, they may equally be applied to the amusements of the preceding reign." This position receives some support from a passage discovered in an old manuscript copy of the romance of *Renard le Contre fait*, where it appears that cards were known in France about 1840. They were, probably, known in Spain as early as in France; for, in 1387, John I., king of Castile, issued an edict against card-playing in his dominions. Baron Heineken claims their invention for Germany, where he states them to have been known as early as the year 1376. And an English author produces a passage cited from a wardrobe account of 1377, the sixth year of Edward I., which mentions a game entitled "the four kings;" and hence he reasonably conjectures that the use of playing-cards was then known in England.

It is the opinion of several learned writers well acquainted with Asiatic history, that cards were used in the East long before they found their way into Europe. If this position be granted, when we recollect that Edward I., before his accession to the throne, resided nearly five years in Syria, he may reasonably be supposed to have learned the game of "the four kings" in that country, and introduced it at court upon his return to England.

An argument against the great antiquity of playing-cards is drawn from the want of paper for their fabrication; paper made with linen rags not having been produced in Europe before the middle of the fourteenth century. Here, however, it is presupposed that cards could not possibly be made with any other material, which is by no means certain.

THE JACOBIN CLUB.

The origin, history, and organization of this famous club, which has exerted so powerful an influence upon the history of France and Europe, and which has given a new word to almost every language of the civilized world, are very little understood, as in no history in the English language are they to be found correctly detailed.

Clubs seem to have been established in France in imitation of the

"Committees" of our own Revolution. The first society which took the name of a club arose at Paris in 1782, and owed its origin to a trivial occurrence. The Duke of Orleans, then Duke of Chartres, cut down most of the trees in the Palais Royal in order to make room for shops, so that a crowd of idlers, who had been accustomed to meet beneath them, were driven to seek another place of meeting, and found it in certain rooms of the same Palais Royal, where the police allowed them to assemble on the express condition that they should not discuss politics nor religion. Thus was founded the *Club Politique*, as it was named, *lucus a non lucendo*. It soon led, both in Paris and in the provinces, to numerous similar associations, which, however, did not always observe the order not to discuss politics; and among others we find mention made in 1785 of a *Club des Américains*, whose members called themselves *puristes libéraux*. These clubs, however, were strictly confined to the upper classes, and were in many respects not unlike the English clubs of the present day. On the meeting of the Etats Généraux at Versailles, the deputies from Brittany, influenced probably by the peculiar condition of that province, formed the Club Breton, which was destined to become the world-renowned Jacobin Club, and to exercise for some years an almost unlimited despotism over France. The first idea of the Club Breton proceeded from no less a personage than Mirabeau, but its founder was Chapelier, a young advocate from Rennes, at whose instance the forty-four deputies from Brittany opened their Club in rooms at No. 86 Avenue St. Cloud, at Versailles, during the month of May, 1789. Its original object was merely the preliminary discussion of the questions which from time to time arose in the States-General, and the advantages of this course, as at once manifested in the correct information and sound judgment of the Breton deputies in that body, soon led to a desire among the deputies of other provinces to join in its deliberations, which was readily allowed, without any formalities. Among its members, who afterwards become prominent, were the Abbé Sièyes, the brothers Lameth, Barnave, Robespierre, and others. As early as June 22, it contained as many as one hundred and fifty members, but from that time till its removal to Paris there are no data for determining their number, though it was largely increased. Soon, a certain formality began to be observed at its meetings, but for a considerable time no records were kept. The prevailing sentiment of the Club was originally by no means hostile to the king, though it soon became so in some degree, after a proffer of its services had been rejected by the ministers. Repulsed, ridiculed, and misrepresented by the court, the Club Breton

began to assume a decided position, to open a correspondence with the provinces, and, in Brittany at least, to encourage the formation of similar associations, in which we may detect the first traces of that grand system of affiliated societies, which constituted the great source of the power of the Jacobin Club. The Club Breton, however, adhered in general to its original object of the preliminary discussion of important questions, though it sometimes originated measures—as the abolition of feudal rights, decreed August 4, 1789—and its influence extended itself more and more, though, as its meetings were not public, its proceedings were not published, and its members were exclusively deputies, it did not come in contact with the people, and its influence with them was therefore very limited.

On Oct. 19, 1789, the Assembly transferred its sessions to Paris, and the Club Breton naturally followed its example, procuring a place of meeting near that of the Assembly,—which was at what is now the corner of the Rue Castiglione and the Rue de Rivoli,—in the Convent of the Jacobins in the Rue St. Honore, whence it afterwards received and adopted the name of the Jacobin Club. As it had ceased to be composed exclusively of deputies from a single province, it was natural that its original name of Club Breton should no longer be considered appropriate, and it was changed to that of *Société des Amis de la Constitution*, for the names of Jacobins and Jacobin Club date from a later period, and, like so many other party names, are said to have been at first derisively applied by their opponents, though they seem to have been readily adopted by the members, and were in general use as early as the beginning of the year 1790. The other was, however, retained as the official name till a much later period, namely, till September 21, 1792, when the Jacobins, having ceased to pretend to care for the constitution, thought proper to change the name to *Société des Jacobins, Amis de l' Egalité et de la Liberté*. As in the Club Breton, deputies alone could at first be members; but soon, in order to increase the intellectual power and influence of the society, political writers who had distinguished themselves by their useful works were admitted, though the number of these was limited to two hundred, who must be residents of Paris; and such was the care pursued in the selection, that it was two months before the number was complete. The election of members of the Club took place at first on nomination by two members, but afterwards, in the case of those not deputies, five and six were required, who guaranteed the political and moral character of the candidate, and then, if the committee found nothing against him, he was balloted for by the Club. All nomina-

tions were in writing, and signed by at least one member of the committee. The names of those nominated remained during two meetings posted on a list, with the names of those proposing them. A person once rejected could not ordinarily be proposed again within a month. Members could be expelled by a majority, one reason for expulsion being non-attendance at meetings for a month. All members must be at least twenty-one years of age.

The number of deputies who became members soon increased to four hundred, and, after the number of two hundred non-deputies was filled up the limitations on their admission were removed. The Club soon grew so large that it removed into the Church of the Jacobins, which was somewhat elaborately fitted up for its reception.

At each end of the room were two very large galleries for spectators, one over the other, the lower one being intended for women and the upper for men. On the front of these galleries was the motto of the Club, *Vivre libre ou mourier*. The hall was always brilliantly lighted, and it never was the case that the members were dirty, tattered persons. The members were always well dressed, and Robespierre is spoken of as maintaining a striking elegance in his attire at the meetings of the Club, for which he was accustomed to prepare himself "with as much care as a lady for a ball." The rabble never were members of the Jacobin Club itself. They found places of meeting in numerous societies patronized and countenanced, it is true, by the Jacobin Club, and some of them meeting in the same building, but never having any recognized official connection with it. The members of the Jacobin Club usually sat with their hats on, but spoke always with uncovered heads. The ordinary meetings were held four times a week, (though at one time they seem to have been held every day that the Assembly did not sit, except Sundays and feast days,) from six o'clock till ten in the evening; but extraordinary meetings were sometimes convened, and at times the Club declared itself *en permanence*, and sat through day and night. Every meeting was opened by the reading of the journal of the preceding one. The ordinary mode of voting was by rising and sitting. The officers were all members of the Club, serving without pay, and elected at regular intervals, the President being chosen at first once a month, but afterwards every fortnight.

The expenses of the Club for rent, light, correspondence, &c. were considerable, and continually on the increase. Every member, therefore, paid 36 livres (about $7.20) a year, but how small a portion of the actual expenses this sum would meet may be inferred from the fact, that in 1791 the disbursements were 47,000 livres for printing,

and 40,000 for postage. The precise number of members in that year does not appear, but in the first half of the year 1792 the average number of members was 3,500, who would therefore have paid 126,000 livres, a sum which could by no means have sufficed for the ordinary and obvious expenses of the Club, and, moreover, by that time the secret expenses had grown to be quite large. There was for a considerable period great difficulty in ascertaining from what source the Jacobins drew the money to supply this deficiency. There seems now to be no doubt that this money was derived from counterfeit *assignats*, made in the prisons of Paris, and put into circulation by the followers of the Club.

As for the relations of the public to the Club, the people were at first entirely shut out from all participation in its proceedings, because its meetings were not open, and only a small number could be daily admitted by the cards of admission. This naturally caused considerable dissatisfaction both within and without the Club; but after the removal to the church the galleries, which would contain 1,500 persons, were constantly crowded; being often filled four hours before the meeting opened. They soon became the meeting-place of large numbers of the lower classes, who were ready to serve any one who could work upon the senses or the imaginations of the masses by good money or poor rhetoric.

The fame of the Club could not long be confined to Paris; and, within a month after the transfer of the Club Breton to the capital, deputies arrived from many of the provinces, who were presented to the Club, and expressed a desire to establish in the principal provincial towns similar societies, which should maintain a close connection with the mother society at Paris, by constant correspondence. The idea of thus making the mother society the central point for a whole family of similar associations, which should be gradually extended over all France, found great favor both in Paris and in the provinces, and was carried into execution with extraordinary rapidity. The system was originally digested and arranged by Adrien Duport, one of the "triumvirate," who possessed a rare talent for organization. The oldest list of the *sociétés affiliées*, as they were called, dates from November, 1790, and contains the names of but 121 places where they had been organized, though there is reason to suppose that as many as 152 societies actually existed at that time. This, however, was only a beginning. At the period of the separation of the Feuillans, in July, 1791, the number of affiliated societies was 400, and was soon increased to 1,000, which seems to have been the highest number attained; for

in April, 1792, 760 only are enumerated, of which not more than 400 kept up a regular correspondence with the mother club. But all the societies formed in the provinces, on the model of the Jacobin Club, did not become affiliated with it. Many remained independent. At various periods of its existence the Club took different means for giving publicity to its proceedings, principally by newspapers conducted under its auspices. The Jacobins in theory, though not always in practice, violently opposed duelling, because it was an "aristocratic vice," "a still remaining root of the tree of feudalism."

The Jacobins published their first declaration of principles on February 8, 1790, and without giving an analysis of its contents, we may remark, that it cannot be too often called to mind that the Jacobins, though always constituting the progressive party,—*La Jeune France*, it would be called nowadays,—yet, during their earlier history, entertained opinions which were very moderate in comparison with their later creed; that they even inculcated "respect for and submission to the powers which the Constitution may call into being," and that, though there were from the outset a few very radical persons among them, the development of their principles was gradual. They did not, as some writers seem to imagine, spring into existence monsters of vice and cruelty. Upon every subject they had fixed and decided opinions, and it was ordinarily their union and decision which gave them the victory over their opponents, who were always wavering and undecided.

At various periods there were secessions from the Jacobin Club, and foundations by the seceders of new clubs, which had more or less success and duration, and on at least one occasion such a secession seemed to endanger the very existence of the Jacobin Club. The great increase of the radical element had so alarmed many of its members, that we find it stated that in the spring of 1791 but fifty deputies to the Assembly were in the habit of attending its meetings, and on July 16 of that year occurred the separation of the Feuillans, which nearly inflicted a death-blow upon the Jacobins, for at first the Feuillans were much their superiors both in numbers and in influence. Of the 2,400 members of the Jacobin Club, 1,800 withdrew from its meetings, and one-third of the latter at once joined the Feuillans, while many others soon followed their example. Only 600 therefore remained with the Jacobins, and even this number was diminished by the thorough "purification" of the Club, which was at once commenced. Still, in spite of this state of things, superior skill and decision soon gave the Jacobins the upper hand, as was especially mani-

fest in the case of the affiliated societies, for, of the 400 then existing, 100 had declared unconditionally in favor of the Jacobins by the middle of August, while the rest remained in correspondence with them, but strongly urged a reunion with the Feuillans. By the end of September, most of the old provincial societies had joined the Jacobins, while all the new ones seem to have done so, more than six hundred in all joining them in August and September, and only four joining the Feuillans. In the Assembly the Jacobins were longer in the minority, though they finally gained the superiority there also. The Feuillans, however, used their power while they retained it to enact a club law, which was passed on the 29th of September, 1791, singularly enough upon the proposition of Chapelier, the original founder of the Club Breton, the increasing radicalism of the Club having forced from it most of its original members, though some afterwards rejoined it. If this law, which precluded any club from acting publicly as a body in any way, had ever been enforced, it would have proved a severe blow to the Jacobin Club; but its enforcement seems never to have been even attempted. The famous contest between the Jacobins *par excellence* and the Girondists distracted the Club for a long time, but was of course finally terminated on the arrest of the Girondists in June, 1793, and their execution in the following October.

After the imprisonment of the Girondists, the Jacobins had all the power of the state in their hands; but now a new phenomenon appeared, though it was not one which ought to have been unexpected. Up to this time the Jacobins had been the radicals, and all their victories had been over those of more moderate views than their own, but now a party arose determined to out-Jacobin the Jacobins. They were called the *Enragés*, or, from the name of their leader, the Hebertists. They made a struggle worthy of a better cause, but were finally overpowered and executed on March 24; and ten days later, the Dantonists, whose views were more moderate than those of the Jacobins, and who had just assisted the latter in their defeat of the Hebertists, were in turn compelled to mount the scaffold. Robespierre was now all-powerful, a dictator in every thing but the name. He, however, did not possess talents adapted to the emergency, and the events of the 9th Thermidor, or July 27, 1794, put an end at once to his power and his life. After the fall of Robespierre, the total destruction of the Jacobin Club would have been no difficult matter, if indeed it would not have died of itself if it had been left alone. But the victors desired to avail themselves of its *prestige*, and to use it for

their own purposes. It was, however, in their hands, only the sceptre of the mighty monarch whom his servants had murdered to possess themselves of his power. The strong arm which had hitherto held it was wanting. A contest at once sprang up between the Jacobins and the Thermidorists, which resulted in the expulsion of the latter from the Club. They however determined to avenge themselves by dooming the Club itself to destruction; and they found no great difficulty in accomplishing this, for all parties were willing to unite to bring about the ruin of a common enemy, and the feeling of the populace in particular had, from various causes, gradually become exceedingly hostile. It was the club law of October 16, 1794, which gave the deathblow to the Jacobin Club. That law forbade all affiliation and correspondence between the societies under a common name, and obliged every society to present to the police a list of its members, with their ages, birthplaces, occupations, and residences past and present, as well as the periods of their admission into the society. The Jacobin Club complied with this law, but still sought to maintain its stand. It was, however, in vain. On Nov. 9 the people stormed its place of sitting, but were driven back. The attack was renewed more pertinaciously two days after, while a proposition was pending in the Convention, for the temporary closing of the Club; but it was again repulsed, leaving the hall filled with the stones hurled by the populace. Then, as the members were gradually slinking away, Caraffa rose and said: "The body of Lepelletier, murdered by the Aristocrats, was exhibited to the people. Marat was borne about with his bloody wounds by the Cordeliers in order to excite the people. I therefore propose, that all the stones which have been hurled against the friends of equality be gathered up and placed upon the president's table, and be exhibited to the people at the beginning of every meeting." This ludicrous proposal, loudly applauded by the few persons present, was the last act of the "Society of the Friends of Freedom and Equality in the former Jacobin Convent at Paris." One by one the most intrepid Jacobins left the hall, and at three o'clock in the morning the doors of the deserted hall were locked and sealed by command of the committee. An attempt was made by a few members to assemble elsewhere, but it was abortive, and thus died the Jacobin Club on Nov. 11, 1794, in the sixth year of its existence. The building in which it held its sittings was destroyed in 1795. It stood on the site of the present Marché St. Honoré.—*Editors.*

THE SEVEN HILLS OF ROME

Form a river-bank of moderate elevation. From the *Capitoline* on the

north, which comes within three hundred yards of the Tiber, to the *Aventine* on the south, which falls almost directly into it, these hills form a segment of considerably more than half a circle. The *Quirinal*, the *Viminal*, *Esquiline*, and the *Cœlian*, which lie more inland, are all tongues of land projecting from the common ridge which bounds the valley, and which slopes away on the farther side insensibly into the Campagna. Arnold compares these projecting tongues of hill to the fingers of an open hand, the knuckles representing the ridge from which they spring, and the back of the hand the gentle slope outwards. The Capitoline and Aventine stand apart as sentinels to guard the stream; and between them, in the centre of the whole group, lies the sequestered *Palatine*, closely embraced by three connected valleys. The heights of these hills, level or nearly so at their summits, hardly any where exceed 150 feet from the level of the Tiber. The Palatine is a trapezium, two sides of which are about 300, and the other two about 400 yards in length. It may be compared in size and shape with the block of buildings enclosing Hanover Square, between Oxford-street and Conduit-street, in London. The Aventine, less regularly shaped, is about equal in dimensions; the Capitoline, with its two summits and saddle between them, is the smallest of the Seven Hills, and does not much exceed 350 yards in length by 100 in breadth. Of the other eminences, which have few distinct features, and are in fact merely undulations of a simple hill, the Viminal is the smallest and best defended; the Esquiline and the Cœlian extend over considerable spaces. These two latter, and the Quirinal, have each more than one knoll, to which at an early period distinct names were assigned, but which were lost to view and recollection when covered with the buildings of the city.

The Palatine was traditionally the cradle of the Roman state: the founders of Rome were a band of brigands and outlaws; and none of the Seven Hills was so well calculated for the retreat of those "wolves of Italy" as the scarped summit of the Palatine encompassed by marsh and jungle. But the Roman hills form an isolated cluster in the centre of a wide extended plain; and it is probable that more than one of them was seized from an early period for the fastness of the tribes which roamed over the Campagna.

A bird's-eye view of Rome may be thus obtained. The Janiculan hill rises nearly 100 feet above the highest elevation on the left bank; and from its arx, on the site of the gate of San Pancrazio, the Seven Hills lie expanded to the view in their full dimensions. "From this point," says Martial, many centuries later, "you might behold the

seven lordly mounts, and measure the entire size of Rome."—Abridged from the *Quarterly Review*, No. 198.

THE RESULT OF THE AMERICAN WAR WITH GREAT BRITAIN FORETOLD.

"I prophesied," said Colonel Barré, "on passing the Stamp Act, in 1765, what would happen thereon; and I now, in March 1769, I now fear I can prophesy further troubles; that if the whole people are made desperate, finding no remedy from parliament, the whole continent will be in arms immediately, and perhaps *these provinces lost to England for ever*." This was in March 1769, and certainly a very remarkable prediction.—PROFESSOR SMYTH's *Lectures on Modern History*.

OLD ENGLISH LAW AGAINST BEGGARS.

For an able-bodied man to be caught a third time begging was held a crime deserving death, and the sentence was intended on fit occasions to be executed. The poor man's advantages, which I have estimated at so high a rate, were not purchased without drawbacks. He might not change his master at his will, or wander from place to place. He might not keep his children at home unless he could answer for their time. If out of employment, preferring to be idle, he might be demanded for work by any master of the "craft" to which he belonged, and compelled to work whether he would or no. If caught begging once, being neither aged nor infirm, he was whipped at the cart's tail. If caught a second time, his ear was slit, or bored through with a hot iron. If caught a third time, being thereby proved to be of no use upon this earth, but to live upon it only to his own hurt and to that of others, he suffered death as a felon. So the law of England remained for sixty years. First drawn by Henry, it continued unrepealed through the reigns of Edward and of Mary, subsisting, therefore, with the deliberate approval of both the great parties between whom the country was divided. Reconsidered under Elizabeth, the same law was again formally passed; and it was therefore the expressed conviction of the English nation that it was better for a man not to live at all than to live a profitless and worthless life. The vagabond was a sore spot upon the commonwealth, to be healed by wholesome discipline, if the gangrene was not incurable; to be cut away with the knife, if the milder treatment of the cart-whip failed to be of profit.—FROUDE's *History of England*.

WHO WERE THE ETRUSCANS?

The Etruscans, long before the period in which the foundation of Rome is placed, flourished—a rich, commercial, and highly cultivated people. The earliest institutions of Rome were Etruscan. Etruria was the parent of her religion; thence were derived the principles of her primitive constitution and government. The Tarquins were an Etruscan family, and we are almost tempted to believe Rome herself an Etruscan city. After the utter downfall of Etruscan independence, the religious rites and ceremonies of Etruria, her emblems of power—the lictors, the fasces, and the curule chair—remained witnesses of her former influence; the reputation of her augurs and diviners subsisted until the first ages of the empire; and the noble youth of Rome received the first lessons of science and learning in Etruscan seminaries, until the philosophy of Greece prevailed, and the colleges of Etruria were deserted for the groves of Academe.

Etruria has left but few materials from which to trace her history. There are architectural fragments, but the name and memory of their builders are gone. There is a language in which we find inscriptions. They are legible, for the character is like the ancient Greek or Phœnician. We can trace the letters and form of words, but their meaning is hidden. They are more unintelligible than the hieroglyphics of Egypt. Two words alone have as yet been interpreted: RIL AVRIL, "years lived." The sentence seems an epitome of our Etruscan history. But one class of remains is rich in information. The funeral monuments of Etruria show us their mode of life. They perpetuated it in their graves. There we can read largely of their customs, and habits, and manners. The contents of these tombs tell us of their widely-extended trade and commerce. They enclose the products of Greece and Egypt, and even of Persia and India.—*North British Review*, No. 6.

WAS THE DUKE OF CLARENCE DROWNED IN MALMSEY?

Foremost among the "childish improbabilities" of the time of Richard of Gloucester may be placed the popular report in Fabyan and Hall, that Clarence was drowned by Gloucester in a butt of malmsey wine, in the Tower of London, Feb. 18, 1478. First, Sir Thomas More insinuates that Gloucester's efforts to save Clarence were fable; next Lord Bacon accuses him of contriving his brother's death; and Shakspeare characterizes him as the associate of the murderers; while Sandford makes him the actual murderer. But no contemporary record exists of the drowning, or of Gloucester's participation in

the execution. It is conjectured that Clarence was sentenced to be poisoned, and that the fatal drug may have been conveyed to him in "malvoesie," or malmsey, then a favorite wine. All that is positively known is simply that he was put to death "secretly within the Tower."—*Chronicle of Croyland.*

Dr. Lingard says: "The manner of his death has never been ascertained; but a silly report was circulated that he had been drowned in a butt of malmsey wine;" which tale Bayley (*Hist. Tower*) thinks owes its origin to the Duke's great partiality for that liquor. Hence

"Maudlin Clarence in a malmsey-butt."—*Lord Byron.*

THE TRUE ROMANCE OF "KENILWORTH."

The unfortunate Anne Dudley (for so she subscribes herself in the Harleian MS., 4712), the first wife of Lord Robert Dudley, Queen Elizabeth's favorite, and, after Anne's death, Earl of Leicester, was daughter of Sir John Robsart. Her marriage took place June 4, 1550, the day following that on which her Lord's eldest brother had been united to a daughter of the Duke of Somerset; and the event is thus recorded by King Edward, in his Diary: "4. S. Robert dudeley, third sonne to th' erle of warwic, married S. John Robsartes daughter; after which mariage ther were certain gentlemen that did strive who should first take away a gose's heade which was hanged alive on tow crose postes." Soon after the accession of Elizabeth, when Dudley's ambitious views of a royal alliance had opened upon him, his countess mysteriously died at the retired mansion of Cumnor, near Abingdon, Sept. 8, 1560; and although the mode of her death is imperfectly ascertained (her body was thrown down stairs as a blind), there appears far greater foundation for supposing the earl guilty of her murder than usually belongs to such rumors; all her other attendants being absent at Abingdon fair, except Sir Richard Verney and his man. The circumstances, distorted by gross anachronisms, have been woven by Sir Walter Scott into his delightful romance of *Kenilworth.*

THE VESSEL IN WHICH WILLIAM III. CAME TO ENGLAND.

This celebrated craft, according to the most reliable accounts, was built on the Thames in the earlier part of the seventeenth century, and was afterwards purchased by the Prince of Orange, or his adherents, and was selected by the prince to convey himself and suite to England; and he bestowed upon her the name of *The Princess Mary*, in honor of his illustrious consort, the daughter of James II.

During the whole of William's reign, the ship held a place of honor as one of the royal yachts, having been regularly used as the pleasure-yacht of Queen Anne. The vessel came into the possession of King George I., by whose order she ceased to form part of the royal establishment. About the middle of the last century she was sold to the Messrs. Walters, of London, from whom she received the name of the *Betsy Cairns*, in honor, we are told, of some West Indian lady of that name. After being long employed in the West Indian trade, she was disposed of, and converted into a collier, and employed between Newcastle and London. She was aferwards (*circa* 1825) again sold, and finally, on the 17th of February 1827, while pursuing her voyage from Shields to Hamburg, with a cargo of coals, she struck upon the "Black Middens," a dangerous reef of rocks north of the mouth of the Tyne, and in a few days afterwards became a total wreck. She had been regarded with an almost superstitious feeling of interest and veneration; and a "memorable prophecy" was said to be associated with her fortunes, viz., "that the Catholics would never get the better while the *Betsy Cairns* was afloat." The remnant of her original timbering was extremely fine. There was a profusion of rich and elaborate oak-carvings, the color of the wood, from age and exposure, closely resembling that of ebony. Snuff-boxes and souvenirs of various kinds were made of the wood, and brought exorbitant prices. Each of the members of the then corporation of Newcastle was presented with one of these boxes of old British oak.—Dr. Lushington has recently stated in court that he was, early in his professional career, concerned in some litigation about this vessel.

HISTORY OF THE HOLY CROSS.

In the reign of the Emperor Constantine the Great, his mother Helena, when almost an octogenarian, undertook a pilgrimage to Jerusalem, in search of the Holy Sepulchre, and the Cross on which Jesus Christ had suffered. A vision, or perhaps dream, disclosed the place of the Holy Sepulchre; the three crosses were found buried near it, and that of the Saviour is said to have been distinguished from the others by its healing powers on the sick, and even restoring a corpse to life. The spot was immediately consecrated by a church, called the New Jerusalem; and of such magnificence, that the celebrated Eusebius regarded it as the fulfilment of the prophecies in the Scriptures for a city of that name. A verse of the sibyl was also remembered or composed, which, like all predictions after the event, tallied in a surprising manner with the object it so happily revealed.

The greater share of the Cross was left at Jerusalem, set in a case of silver; and the remainder was sent to Constantine, who, in hopes of securing the prosperity and duration of his empire, enclosed it within his own statue on the Byzantine Forum. The pilgrims also, who thronged to Jerusalem during a long course of years, often obtained a small fragment of the Cross for themselves; so that at length, according to the strong expression of St. Cyril, the whole earth was filled with this sacred wood. Even at present there is scarcely a Roman Catholic cathedral which does not display some pretended pieces of this relic; and it has been computed, with some exaggeration, that were they all collected together, they might prove sufficient for building a ship of the line. To account for this extraordinary diffusion of so limited a quantity, St. Cyril has asserted its preternatural growth and vegetation, which he ingeniously compares to the miracle of the loaves and fishes.

From this period the history of the holy Cross may be clearly traced through the twelve succeeding centuries. In spite of its frequent partitions, say the monkish writers, the Cross remained undiminished at Jerusalem until the year 614, when that city was besieged and taken by the Persians, who removed the relic to Persia, where it continued fourteen years, until the victories of the Emperor Heraclius, who restored it to its former station on Mount Calvary; the emperor laying aside his diadem and purple, and bearing the Cross on his own shoulders towards the Holy Sepulchre. An officer was then appointed to its peculiar care, with the title of *Staurophulax;* and the anniversary of this event, the 14th of September, is still celebrated in the Greek Church as a festival, under the name of the Exaltation of the Cross.

Only eight years afterwards (A. D. 636), an army of Arabs, proselytes of Mahomet, invaded Palestine; the imperial forces were routed at Termuck, and Heraclius, downcast and dismayed, returned to Constantinople, bearing with him the invaluable fragment, whose alleged miraculous powers were never exerted for its own protection. It was, however, preserved at Constantinople with the utmost veneration in the church of St. Sophia, and the honors paid to it are attested by the father of English historians, Bede. Never but on the three solemn festivals of the year was its costly case unclosed; when a grateful odor pervaded the whole church, and a fluid resembling oil distilled from the knots in the wood, of which the least drop was thought sufficient to cure the most inveterate disease.

In the year 1078 the holy Cross recommenced its travels. During

the tumultuous deposition of Michael VII., a wealthy citizen of Amalfi secured the Cross in its golden case set with jewels, and offered the relic at the shrine of St. Benedict, at Casinum. We next trace the Cross to Palestine, where the Crusaders bore it in the van of their armies when marching against the Mussulmen; during one of their battles with Saladin, the sacred relic was broken, and one-half of it was captured by the enemy, and most probably destroyed.* The remaining fragment, early in the thirteenth century, took the field with the King of Hungary and the Duke of Austria; from whom it passed into the hands of their brother-crusaders, the Latin sovereigns of Constantinople; but it was not received with its ancient share of veneration—a new Crown of Thorns, alleged to be that of the Passion, held at this period a far higher rank with the public.

In the year 1238, the pressure of poverty and impending ruin compelled the Emperor Baldwin II. to sell what the piety of Louis, King of France, induced him as eagerly to purchase. A very considerable sum was given in exchange for the holy wood; and on its arrival in Paris, it was deposited by King Louis in a chapel which he built on this occasion.† There the Cross remained for above three hundred years, until May 20, 1575, it disappeared from its station: the robber could not be traced, nor the spoil recovered, when it was reported that Henry II. had secretly sold it to the Venetians; and to appease the angry murmurs of his subjects, Henry, the next year, on Easter-day, announced that a new Cross had been prepared for their consolation, of the same shape, size, and appearance as the stolen relic, and asserted that in Divine powers, or claim to religious worship, it was but little inferior to its model; and "the people of Paris," says Estoile, an eye-witness of this transaction, "being very devout, and easy of faith on such subjects, gratefully hailed the restoration of some tangible and immediate object for their prayers." Of the original fragment no further trace has been found.

It should be added, that Constantine the Great obtained, at the same time with the Cross, the pretended nails of the Passion. He melted part of them into a helmet for himself: and the other part was converted into a bridle for his horse, in supposed obedience to a prophetic text of Zechariah: "In that day shall there be upon the bells (bridles) of the horses, holiness unto the Lord" (Zech. xiv. 20). Yet, though the helmet alone might appear to have required all the nails

* There is some account of its recovery by a Genoese, but it is clouded with miracles; he walked over the sea as over dry land, &c. See *Muratori*.

† This beautiful edifice (Saint Chapelle) was restored in 1856.

which could possibly be employed in a crucifixion, it is not unusual in southern Europe to meet with fragments of old iron for which the same sacred origin is claimed. All the nails from the time of Constantine are rejected as spurious by Cardinal Baronius; yet Pope Innocent VI. expressed his belief in their authenticity. One of the nails is stated to have been used in the Iron Crown of Lombardy.

SHAKSPEARE'S PLAY OF HENRY V.

The extraordinary confusion of place and time pervading the Second Part of King Henry IV., is very noteworthy. News of the overthrow of Archbishop Scrope is brought to London on the very day on which Henry IV. sickens and dies; whereas that king was himself in person in the north, and insisted upon the execution of the archbishop, just eight years before. The archbishop was beheaded on Whit-Monday (June 8), in the year 1405. Henry IV. died March 20, 1413. And, instead of Henry, the prince, being either at Windsor, hunting, or in London with Poins and others, his continual followers, when his father was depressed and perplexed by the rebellion in the north, he was doing his duty well, gallantly, and to the entire satisfaction of his father. We have a letter, dated Berkhampstead, March 13, 1405, written by the king to his council, with a copy of his son Henry's letter, announcing the victory over the French rebels at Grosmont, in Monmouthshire, which was won on Wednesday, the 11th of that month.—TYLER'S *Life and Character of Henry V.*

FAMILY LIKENESSES.

Southey, in a letter to Sir Egerton Brydges, says: "Did you ever observe how remarkably old age brings out family likenesses,—which, having been kept, as it were, in abeyance while the passions and business of the world engrossed the parties, come forth again in age (as in infancy), the features settling into their primary characters before dissolution? I have seen some affecting instances of this; a brother and sister, than whom no two persons in middle life could have been more unlike in countenance or in character, becoming like as twins at last. I now see my father's lineaments in the looking-glass, where they never used to appear."

THE CHILD'S CAUL.

The preservative value of the Child's Caul is hardly worn out. The caul is a membrane found on some children encompassing the head

when born. This is thought a good omen to the child itself: and the vulgar opinion is, that whoever obtains it by purchase will be fortunate and escape danger. Œlius Lampridius relates that Diadumenus, who came to the sovereign dignity of the empire, was *born with a caul.* This superstition was very prevalent in the primitive ages of the church; and St. Chrysostom inveighs against it in several of his homilies. In France it is proverbial. "*Etre né coiffée*" signifies that a person born with a caul, or coif, is extremely fortunate; and if he grew to be a lawyer, it presaged that he would wear the sergeant's and judge's coif; while midwives have sold cauls to advocates to make them eloquent. It has also been sold for magical uses. Grose says that a person possessed of a caul may know the state of health of the person who was born with it: if alive and well, it is firm and crisp: if dead or sick, it is relaxed and flaccid. In Ben Jonson's *Alchymist*, Face says, "You're born with a caul o' your head." Melton, in his *Astrologasta*, states "that if a child be born with a cawle on his head, he shall be very fortunate." Weston, in his *Moral Aphorisms from the Arabic*, 1801, says: "The caul that enfolds the birth is the powerful guardian, like the seal rings of a monarch, for the attainment of the arch of heaven, where, in the car of a bright luminary, it is crowned and revolved;" and in a note is added: "The superstition of the caul comes from the East; there are several words in Arabic for it." But the caul, thought medicinal in diseases, is also esteemed *an infallible preservative against drowning;* and is therefore to this day advertised in the newspapers for sale, especially to persons going to sea. We quote from three advertisments, omitting the addresses of reference:

"A Child's Caul for sale. Apply," &c.—*Times*, Sept. 9, 1884.

"A Child's Caul to be disposed of, a well-known preservative against drowning, &c, price 10 guineas. Address," &c.—*Times*, June 2, 1835.

"To Mariners, &c. To be sold, a Child's Caul, price 15 guineas. Apply," &c.

The price asked has often been from twenty to thirty guineas. The chief purchasers of cauls are seamen, a class of persons who, as they are more than most others exposed to danger which human foresight and exertion can hardly avert, still remain, more than others, disposed to trust to supernatural means for their safety. In Ruddiman's *Glossary to Douglas's Virgil* the caul is designated a *haly* or *sely* how, i. e. holy or fortunate cap or hood. Now, we are inclined to refer the caul preservative to the same superstitious idea which seems to have attached to the fact of burying a corpse in a monk's *cowl*, for which we may, among other authorities, refer to Holinshed. Speaking of

the death of King John, he says: "For the manner was at that time in such sort to bury their nobles and great men, who were induced, by the imagination of monks and fond fancies of friars, to believe that *the said cowl was an amulet*, or defensative to *their souls*, from hell and hellish hags, how or in whatsoever sort they died."

Again, *cowl* and *caul* both allude to the covering of the head. The language formerly used at the English court and among the higher ranks of society was Norman-French; and, of course, with the French pronunciation, as in the diphthong *au*, pronounced *ou* or *aw*, as in Paul's, which was formerly pronounced *Powle's.—Family Friend.*

POISONS OF THE ANCIENTS.

At the annual conversazione, at the college of physicians, in the year 1832, Sir Henry Halford read a paper embodying much patient research; in which he investigated the causes of the death of certain celebrated characters of antiquity, with especial reference to the knowledge of poisons possessed by the ancients. The only portions of the classical anecdote in this paper which are suited to our present purpose, are those which correct certain erroneous notions as to the deaths of Hannibal and Alexander the Great.

What was the poison by which Hannibal destroyed himself? It is improbable that we shall ever know. Modern chemistry has discovered a variety of subtle poisons that might be introduced into a ring, and under certain circumstances destroy life. One drop of prussic acid might produce paralysis, and if taken into the stomach would instantly arrest the current of life. But, it was not likely that the Carthaginians were acquainted with prussic acid. Libya, most probably, produced poisons sufficiently subtle and destructive to accomplish the fatal purpose of Hannibal. As to the report of its being bullock's blood, that must be a fable, as well as in the case of the death of Themistocles; for it is well ascertained that the blood of the ox is not poison. An accomplished nobleman told Sir Henry that he had been present at a bull-fight in Spain, when, after the matador had killed the bull, a person ran up, caught the animal's blood in a goblet, and drank it off as a popular remedy for consumption.

Alexander the Great is said to have been poisoned: but this is inconsistent with the very detailed account of his illness given by Arrian. The report is that the poison was sent by Antiphon, and was of so peculiar a nature that no silver or metallic substance would contain it, and it was conveyed in the hoof of a mule. But the article was really onyx, as Horace says:—

"Nardi parvus onyx."

Now, the word onyx, in Greek, signifies not only a stone but *unguis*, a hoof or nail; and the second sense has evidently been given instead of that of a precious stone. Alexander really died of a remittent fever, caught at Babylon.

DURABILITY OF BRICKS.

An impression exists in reference to the want of durability in bricks as a building material, of the correctness of which a little reflection will convince us there is some doubt, provided they be properly made. So far from being the most perishable, they are the most durable substance; and the bricks of Nineveh and Babylon, in the museums, show that they were selected by the Ancients as the most lasting material. Plutarch thinks them superior in durability to stone, if properly prepared; and it is admitted that the baths of Caracalla, those of Titus, and the Thermæ of Dioclesian, have withstood the effects of time and fire better than the stone of the Coliseum, or the marble of the Forum of Trajan; yet the bricks of Nineveh and Babylon (and we believe those of the Romans also,) were only sun-dried—not baked or burned, as the modern practice is.

ANCIENT GLASS PAINTING.

There is an ignorant opinion among people that the ancient art of glass-painting is completely lost: it is totally void of foundation, for we can carry it to a much higher pitch than the ancients, except in one particular color, and we come very near to that. We can blend the colors, and produce the effects of light and shadow, which they could not do, by harmonizing and mixing the colors in such a manner, and fixing by proper enamelling and burning them, that they shall afterwards become just as permanent as those of the ancients, with the additional advantage of throwing in superior art. In modern times glass painting has been carried to the greatest perfection in Munich.

GAMING HELLS.

The room in St. James's, formerly appropriated to Hazard, was remarkably dark, and conventionally called by the inmates of the palace, "Hell." Whence, and not as generally supposed, from their own demerits, all the gaming-houses in London are designated by the same fearful name. Those who play, or have played English Hazard, will recollect that, for a similar inconsequent reason, the man who

raked up the dice, and called the odds, was designated "the groom-porter."—THEODORE HOOK.

ANCIENT AQUEDUCTS.

Many have believed that the ancients were ignorant of the law that fluid in pipes will rise to the level of its source, because in all the ruins of their aqueducts, the channel is a regular slope. Some of these aqueducts as works of magnitude, are not inferior to the great wall of China, or the Egyptian pyramids; yet, at the present day, a single pipe of cast iron is made to answer the same purpose, and even more perfectly. It is now ascertained, however, that it was not ignorance of the principle, but want of fit material for making the pipes, which cost our forefathers such enormous labor.—Dr. ARNOTT's *Elements of Physics.*

WHITTINGTON AND HIS CAT.

The fable of the Cat is borrowed from the East. Sir William Gore Ousely, in his *Travels*, speaking of the origin of the name of an Island in the Persian Gulf, relates, on the authority of a Persian MS., that, in the tenth century, one Keis, the son of a poor widow in Siráf, embarked for India, with his sole property, a cat. "There he fortunately arrived at a time when the palace was so infested by mice or rats that they invaded the king's food, and persons were employed to drive them from the royal banquet. Keis produced his cat; the noxious animals soon disappeared; and magnificent rewards were bestowed on the adventurer of Siráf, who returned to that city, and afterwards with his mother and brothers, settled in the Island; which, from him, has been denominated *Keis*, or, according to the Persian, *Keish.*"

ENGLAND THE CENTRE OF THE TERRESTRIAL HEMISPHERE.

If we divide the globe into two hemispheres, according to the maximum extent of land and water in each, we arrive at the curious result of designating England as the centre of the former, or terrene half; an antipodal point, near New Zealand, being the centre of the aqueous hemisphere. The exact position in England is not far from the Land's End; so that if the observer were there raised to such a height as to discern at once the half of the globe, he would see the greatest possible extent of land; if similarly elevated in New Zealand, the greatest possible surface of water.—*Quarterly Review*, 1849.

PELASGIC, CYCLOPEAN, AND ETRUSCAN ARCHITECTURE.

These three terms have been strangely misapplied to specimens of ancient architecture in middle Italy, merely because the style is colossal compared with the later works of Roman construction; whereas, to apply the term Cyclopean to the Etruscan style is not less absurd than to identify the Druidical temples of Stonehenge and Abury with the massive style of our early Saxon architecture.

The *Pelasgic* construction was almost invariably polygonal, consisting of enormous blocks of stone; the angles of one exactly corresponding with those of the adjoining masses; and put together without cement, so accurately as to leave no interstices whatever. The Pelasgi built, eighteen centuries before Christ, the walls of Lycosura, which Pausanias calls "the most ancient, and the model from which all other cities were built." The *Cyclopean* wall is composed of large irregular polygonal masses, with smaller stones filling up the interstices between them. The finest specimens are the walls of Tiryns and Mycenæ, upwards of 3000 years old. The *Etruscan* walls are generally built of parallelograms of soft calcareous stone or of tufa, laid with more or less regularity in horizontal courses, without cement.

THE CURFEW.

The erroneous notions which long prevailed upon the original object of the Curfew, show how liable men are to overcharge the memory of an oppressor, and to mistake good for evil intentions, simply because they emanate from a man usually characterized for cruelty. The custom of covering up fires about sunset in summer, and about eight at night in the winter, at the ringing of a bell, called the *couvre-feu* or curfew-bell, is supposed to have been introduced by William I., and to have been imposed upon the English as a badge of servitude; and it has often been quoted to show with what severity the Conqueror sought to press his cruel government, even to the very firesides of our forefathers. Henry, in his *History of Britain*, qto. edit., vol. iii. p. 567, however, says this opinion does not seem well-founded; for there is sufficient evidence that the same custom prevailed in France, Spain, Italy, Scotland, and probably in all the other countries of Europe, at this period: it was intended as a precaution against fires, which were then very frequent and very destructive when so many houses were built of wood; and of such fires the Saxon Chronicle makes frequent mention. Again, the Curfew is stated to have been used in England at a much earlier date than the Conqueror's reign,

and by one of England's best monarchs, Alfred, the restorer of the University of Oxford; who ordained that all the inhabitants of that city should, at the ringing of the Curfew-bell at Carfax, cover up their fires and go to bed: which custom, it is stated in Peshall's *History of Oxford*, "is observed to this day, and the bell as constantly rings at eight as Great Tom tolls at nine." It is therefore reasonable to conclude that the Conqueror revived or continued the custom, which he had previously established in Normandy, and regarded in both countries as a beneficial law of police.

We likewise find the Curfew mentioned to a very late period as a common and approved regulation, which would not have been the case had it been originally imposed as a "badge of servitude," or a law to prevent the people meeting to concert by their firesides the means of resisting William's oppressive rule. We even find the ringing of the Curfew-bell provided for by bequests of tracts of land or other property; although this ringing was but the relic of the custom; for the people are not supposed to have been compelled to put out their fires and lights beyond the reign of William II. Henry I. restored the use of lamps and candles at court in the night, after the ringing of the Curfew-bell, which had been prohibited by his predecessors. In further proof that the custom cannot justly be considered as evidence of an unworthy state of subjection, is the fact that the obligation to extinguish fires and lights at a certain hour was imposed upon his subjects by David I., King of Scotland, in his *Leges Burgorum;* and in this case, no one ever imagined that it conveyed any sign of infamy or servitude.

LENT.

Lent is commonly said to be named from a Saxon word for Spring. It was originally called Quadragesima, and only lasted forty hours, from twelve on Good Friday to Easter morn; but it was gradually extended to forty days, after the fasts of Moses (Deut. ix.); of Elijah (1 Kings xix); of the Ninevites (Jonah iii.); and of our Lord himself (Matt. iv.); all of which fasted forty days. This fast begins on Wednesday, because the six Sundays being festivals, were not included in the fasting-days; and therefore, unless four days were added before the first Sunday in Lent, the fast would only last thirty-six days instead of forty.—*Elementa Liturgica.*

Ash Wednesday, the first day of Lent, originated in the blessing of ashes on that day, "to put in remembrance every Christian man, the beginning of Lent and Penance, that he is but ashes and earth, and

thereunto shall return;" and the ceremony was reserved at the Reformation.

Mid-Lent, the fourth Sunday in Lent, was anciently kept by Roman Catholics visiting their mother-church, and making their offerings at the high altar. Thence arose the dutiful custom of visiting parents on this day, therefore called *Mothering Sunday;* when the children were treated with a regale of excellent frumenty, or they presented their *mother* with a sum of money, a trinket, &c. On the following Sunday, preceding Palm Sunday, fried peas, or *carlings*, are eaten in the North.

OBSERVANCE OF LENT.

The Lent Fast was called by the Latins, *Quadragesima*, but whether on account of its being originally a fast of *forty days*, or only *forty hours*, has been much disputed. Bingham inclines to the opinion that, at first, it was only forty hours. St. Jerome, St. Leo, St. Augustin, and others, consider this fast to have been first instituted by the apostles; by others it is asserted not to have been known in the earlier ages of the Christian church.

Lent was first observed in England by our Saxon ancestors; whence its name, *Lencten*, implying Spring, the season when the day increases in *length*, about the commencement of which this fast usually falls. The observance of abstinence at Lent in that country, however, appears to have been more a matter of secular moment than religious mortification; so that altogether, the regulations after the Reformation enacted abstinence in as strict a manner, though not ostensibly on the same grounds, as it is enjoined in the church of Rome. A statute of 1548 runs thus—"in the time commonly called Lent—the King's Majesty considering that due and godly abstinence is a mean to virtue, and to subdue men's bodies to their soul and spirit, and considering also *especially that fishers and men using the trade of fishing in the sea may thereby be set to work, and that by eating of fish much flesh will be saved and increased*," enacts after repealing all existing laws on the subject, that such as eat flesh at the forbidden season shall incur a penalty of ten shillings, or ten days' imprisonment *without flesh*, and and a double penalty for the second offence.

The next statute relating to abstinence is one *entirely for the increase of the fishery*. It enacts, that no one, unless having a license, shall eat flesh on fish-days, or on Wednesdays, now made an additional fish-day, under a penalty of *3l.*, or three months' imprisonment. Except that every one having three dishes of sea-fish at his table, might

have one of flesh also. But, "because no manner of person shall misjudge of the intent of this statute," it is enacted that whosoever shall notify that any eating of fish or forbearing of flesh mentioned therein is of any necessity for the saving of the soul of man, or that it is the service of God, *otherwise than as other politic laws are and be;* that then such persons shall be punished as spreaders of false news.

Many proclamations appear to have been issued in order to enforce an observance so little congenial to the propensities of Englishmen. One of those in the first year of Edward was before any statute; and its very words respecting the indifference of meats in a religious sense, were adopted by the legislature the next year. In one of Elizabeth's, A. D. 1572, as in the statute of Edward, the political motives of the prohibition seem, in some measure, associated with the superstition it disclaims; for eating in the season of Lent is called "licentious and carnal disorder, in contempt of God and man, and only to the satisfaction of devilish and carnal appetites;" and butchers, &c., "ministering to such foul lust of the flesh," were severely mulcted. Again, in 1579, and, as far as Mr. Hallam has observed, in all of a later date, the encouragement of the navy and fishery is set forth as their *sole ground*. This compulsory observance of Lent was continued long after the Reformation; although, from the beginning the system was only compulsory on the poor, licenses for eating flesh and white meats during Lent, being easily obtainable by payment.

Howell, in one of his amusing *Letters*, dated Ash-Wednesday, 1654, throws additional light upon this secular observance of Lent, as follows:—"Now that Lent and Spring do make their approach, in my opinion, fasting would conduce much to the advantage of the soul and body; though our second institution of observing Lent aimed at civil respects, as to preserve the brood of cattle, and advance the profession of fishermen, yet it concurs with the first institution, viz. a pure spiritual end, which was to subdue the flesh, and that being brought under, our other two spiritual enemies, the world and the devil, are the sooner overcome. The naturalists observe, that morning spittle kills dragons; so fasting helps to destroy the devil, provided it be accompanied with other acts of devotion; to fast for one day only, from about nine in the morning till four in the afternoon, is but a mock fast:"—or in his lame verse:

"This is not to keep Lent aright,
But play the juggling hypocrite:
He truly Lent observes, who makes the inward man
To fast, as well as make the outward feed on bran."

USE OF INCENSE.

Incense, or Frankincense (the *Thus* of the druggist), exudes by incision, and dries as a gum, from *Arbor thurifera;* and was formerly burnt in the temples of all religions, in honor of the divinities that were there adored. Many of the primitive Christians were put to death because they would not offer incense to idols. In the churches of Rome and of the Greek Islands, incense is used at high mass, and in solemn ceremonies, and particularly at the funerals of the hierarchy and other personages of exalted rank. Pure frankincense is frequently mentioned in Exodus.

"It was from this religious custom of employing incense in the ancient temples, that the royal prophet drew that beautiful simile of his, when he petitioned that his prayers might ascend before the Lord like incense (Luke i. 10). It was while all the multitude was praying without, at the hour of incense, that there appeared to Zachary an angel of the Lord, standing on the right side of the altar of incense. That the nations attached not only a meaning of personal reverence, but also of religious homage, to an offering of incense, is demonstrable from the instance of the Magi, who, having fallen down to adore the new-born Jesus, and recognized his divinity, presented him with gold, myrrh, and frankincense. The primitive Christians imitated the example of the Jews, and adopted the use of incense at the celebration of the Liturgy. The use of incense in all the oriental churches is perpetual, and almost daily; nor do any of them celebrate their Liturgy without it, unless compelled by necessity. The Coptic, as well as other Eastern Christians, observe the same ceremonial as the Latin Church in incensing their altar, the sacred vessels, and ecclesiastical personages."—*Dr. Rock's Hierurgia.*

Virgil thought that frankincense was only found in Arabia, *Solis est turea virga Sabæis* (G. ii. 117), in which opinion he is followed by Pliny. Vast quantities are gathered from trees growing near to the northern bay of the Red Sea, at the foot of Mount Sinai. It was called *Tus* or *Thus* by the dealers in Egypt, from *Thur* or *Thor*, the name of a harbor in that bay, and therefore distinguished from the gum Arabic, which comes from Suez. Olibanum is, however, believed to have been one of the ingredients in the sweet incense of the Jews; it is still burnt as incense in the Greek and Romish churches; and "incense prepared for altar-service," as supplied by druggists, is nothing more than gum olibanum of indifferent quality, and not at all like the composition as especially commanded by God, the form for which is given in full in Exodus.

Instead of being consumed "upon the altar" incense is now burned in a *censer*, such as is depicted on the temple-walls in Egypt, from Meroë to Memphis: and in the British Museum there is a vase (No. 2595), or censer, from an Egyptian catacomb. The censer is now made either of brass, German silver, or the precious metals; it resembles a saucer and an inverted cup, the latter being perforated to allow the escape of the perfume. In the outer saucer is placed an inner one of copper, which can be taken out and filled with ignited charcoal; and this being replaced in the censer, is covered with the incense, and the heat rapidly volatilizes it in visible fumes. The effect is assisted by the incense-bearer swinging the censer, attached to three long chains, in the air. The manner of swinging varies slightly in the churches in Rome, in France, and in England, some holding it above the head. At the church of La Madeleine, in Paris, the method is always to give the censer a full swing at the greatest length of the chain with the right hand, and to catch it up short with the left hand. The censer is technically termed a *Thurible*. Pastilles were evidently derived by the French from the use of incense at the altars.

THE BLOOD OF ST. JANUARIUS.

One of the most imposing miracles of Rome is the Blood of St. Januarius, which is said to have been preserved in a dry state for ages, but liquefied itself spontaneously, and rose and boiled at the top of the vessel which contained it. M. Salverte informs us that this blood of the saint is made by reddening sulphuric ether with alkanet root, and then saturating the liquid with spermaceti. This preparation will remain fixed at a temperature of 10° per cent. above freezing, and melts and boils at 20°, a temperature to which it can be raised by holding the phial for some time in the hand.

FALLACIES OF STATISTICS.

Archbishop Whately remarks upon the overrated importance of Statistics:

Increase of a thing is often confounded with our increased knowledge of it. When crimes or accidents are recorded in newspapers more than formerly, some people fancy that they happen more than formerly. But crimes, especially (be it observed) such as are the most remote from the experience of each individual, and therefore strike him as something strange, always furnish interesting articles of intelligence. I have no doubt that a single murder in Great Britain

has often furnished matter of discourse to more than twenty times as many persons as any twenty such murders would in Turkey. Some foreign traveller in England is said to have remarked on the perceptible diminution in the number of crimes committed during the sitting of Parliament as a proof of our high reverence for that assembly; the fact being, as we all know, that the space occupied in the newspapers by the debates causes the records of many crimes to be omitted. Men are liable to form an over-estimate of the purity of morals in the country as compared with a town, or in a barren and thinly-peopled as compared with a fertile and populous district. On a given area, it must always be expected that the absolute amount of vice will be greater in a town than in the country, so also will be that of virtue; but the proportion of the two must be computed on quite different principles. A physician of great skill and in high repute, probably loses many more patients than an ordinary practitioner; but this proves nothing till we have ascertained the comparative numbers of their patients. Mistakes such as this (which are very frequent) remind one of the well-known riddle, "What is the reason that white sheep eat more than black ones?"

SCRIPTURE PRICES.

Abraham bought a piece of land for a burying-place. He paid 400 shekels of silver. The lowest sum at which a shekel is estimated is two shillings and three pence. This would make about $200 for the burying-place. In Solomon's time it is mentioned that the price of a chariot from Egypt was 600 shekels of silver (1 Kings x. 29). This would be about $250. The price of a horse was 150 shekels, or some $72. King Solomon, in a valuable chariot, drawn by two or four of the horses, made as showy and as dignified an appearance perhaps as any princes have since.

PAST AND PRESENT VALUE OF MONEY.

In reading accounts of the expense of living in past ages, its amount, at first sight, appears almost incredibly low; the reader in few cases rightly estimating the comparative value of money in the past and present times. Thus, the silver shilling in the twelfth century and for some centuries afterwards, weighed three times as much as it now does; and, on account of the scarcity of money, the expense of living varied from one-fifth to one-eighth of what it does at the existing period. The real proportion is continually varying; but, in

order to avoid exaggeration, and to arrive at an even sum, 6⅔ has been assumed as the general average, and this multiplied by three gives twenty; or, in other words, the value of a certain sum then was equal to twenty times as much as at the present day. From the increasing quantity of the circulating medium, soon after this period the difference in the expense of living decreased to the average of five; and therefore, and for some centuries to come, the multiplier will be fifteen instead of twenty.—YOUATT, *on Sheep*, p. 200.

The following Comparative Table of English Money is from Sir Frederick M. Eden's *State of the Poor, &c.* The unit or present value refers, of course, to that of the shilling before the last coinage, which reduced it:

Dates.		Value of Pound sterling present money.	Proportion.
		£ *s.* *d.*	
Conquest	1066	2 18 1½	2.906
18 E. I.	1300	2 17 5	2.871
18 E. III.	1344	2 12 5¼	2.622
20 E. III.	1346	2 11 8	2.588
27 E. III.	1358	2 6 6	2.325
13 H. IV.	1412	1 18 9	1.937
4 E. IV.	1464	1 11 0	1.550
18 H. VIII.	1527	1 7 6¾	1.378
34 H. VIII.	1543	1 3 8¼	1.163
36 H. VIII.	1545	0 13 11¼	0.698
37 H. VIII.	1546	0 9 3½	0.466
5 E. VI.	1551	0 4 7¾	0.232
6 E. VI.	1552	1 0 6¾	1.028
1 Mary	1553	1 0 5¾	1.024
2 Eliz.	1560	1 0 8	1.033
43 Eliz.	1601	1 0 0	1.000

In 1299 the price of a fat lamb in London, from Christmas to Shrovetide, was 16*d.* (Stillingfleet's *Chronicum Rusticum*, p. 66.) Three years afterwards the price of a fat wether was 1*s.*, and that of a ewe 8*d.* (Dugdale's *Hist. St. Paul's Cathedral*); and in 1309 there is a notice of an extravagant price given on occasion of an installation feast, when 200 sheep cost £30, or 3*s.* per head (W. Thorn, in the *Decem Scriptores*). The reader will not much err if he multiplies these sums by 15, as expressive of their proportionate value at the present day.

The following extract from a table exhibiting the progress in the

depreciation of money from the Norman Conquest to the end of the eighteenth century (originally constructed for Sir George Shuckburgh Evelyn's *Memoir of a Standard for Weight and Measure*), is from Ruding's *Annals of the Coinage*.

In 1050 the price of wheat per bushel was 2¼*d*., and the cost of an ox 7*s*. 6*d*.; in 1150 wheat was 4½*d*. per bushel, and an ox only 4*s*. 8¼*d*.; husbandry labor at the same time was 2*d*. per day. In 1250 wheat was 1*s*. 7¾*d*., and an ox £1 0*s*. 7*d*.

		s.	*d*.		£	*s*.	*d*.		*s*.	*d*.	
In 1350	wheat	1	10½,	an ox	1	4	6,	labor	0	3	per day.
1450	"	1	5,	"	1	15	8,	"	0	3¾	"
1550	"	1	10½,	"	1	16	7,	"	0	4	"
1600	"	4	0½,	"		—		"	0	6	"
1675	"	4	6,	"	3	6	0,	"	0	7½	"
1760	"	3	9¾,	"	8	10	0,	"	0	11	"
1795	"	7	10,	"	16	8	0,	"	1	5¼	"

The depreciation of money, consequently, compared with the price of wheat (taking it in 1050 at 10), would be represented in 1350 by 100, in 1550 by the same, in 1675 by 246, in 1760 by 203, and in 1795 by 426.

According to Child, in his *Discourse on Trade*, the price of land in England in 1621 was no more than twelve years' purchase. Sir Charles Davenant states that in 1666 it had risen to fourteen to sixteen years' purchase. From the accounts of the purveyors of Prince Henry's household, for the early part of the seventeenth century, we learn that, in 1610, the price of beef was about 3¾*d*., and mutton about 3¾*d*. the pound. In 1619 the price of two cauliflowers was 3*s*.; and among the articles provided a few years previously for the household of James's queen, are a few potatoes charged at 2*s*. a pound.—Abridged from *Notes and Queries*, No. 283.

Numismatists are of opinion that the coins of Henry VII., with the head *in profile*, are the first English money bearing a likeness of the sovereign.

PRICES OF AGRICULTURAL LABOR IN THE FOURTEENTH CENTURY.

In the year 1352, the 25th of Edward III., wages paid to haymakers were but 1*d*. per day; a mower of meadows 3*d*. a day, or 5*d*. an acre; reapers of corn, in the first week in August, 2*d*., in the second, 4*d*. per day, and so on until the end of the month, without meat, drink,

or other allowance, finding their own tools. For threshing a quarter of wheat or rye, $2\frac{1}{2}d.$; a quarter of beans, peas, barley, or oats, $1\frac{1}{2}d.$ By the 13th of Richard II., in the year 1389, the wages of a bailiff of husbandry was 13*s.* 4*d.* a year, and his clothing once during that time at most; a carter, 10*s.*; shepherd, 10*s.*; ox-herd, 6*s.* 8*d.*; cow-herd, 6*s.* 8*d.*; swine-herd, 6*s.*; a woman-laborer, 6*s.*; a day-laborer, 6*s.*; a driver of ploughs, 7*s.* From this time up to the 23d of Henry IV., the price of labor was fixed by the justices by proclamation. In 1444, 23d Henry IV., the wages of a bailiff of husbandry were 23*s.* 4*d.* per annum, and clothing of the price of 5*s.*, with meat and drink; chief hind, carter, or shepherd, 20*s.*, and clothing, 4*s.*; common servant of husbandry, 15*s.*, clothing, 3*s.* 4*d.*; woman-servant, 10*s.*, clothing, 4*s.* In time of harvest, a mower, 4*d.* a day—without meat and drink, 6*d.*; a reaper or carter, 3*d.* a day—without meat and drink, 5*d.*; a woman-laborer, and other laborers, 2*d.* a day—without meat or drink, $4\frac{1}{2}d.$ By the 11th Henry VII., 1496, there was a like rate of wages, only with a little advance.

PAY OF TROOPS IN THE THIRTEENTH CENTURY.

The pay assigned to Troops who, having contributed the stipulated service for their holdings or assessments, were required to render further assistance to the king in his wars, we discover in the Roll of Expenses of King Edward I., at Ruddlan Castle, Wales, in 1281–2. From this document we find:

The pay of	Per diem.	In modern money.
A knight	12*d.*	15*s.*
An esquire	12*d.*	15*s.*
An archer	2*d.*	2*s.* 6*d.*
A cross-bowman	2*d.*	2*s.* 6*d.*
A captain of twenty (bowmen)	4*d.*	5*s.*
A constable (of 100 bowmen)	6*d.*	7*s.* 6*d.*

PRICES OF PROVISIONS AT ROME IN THE FOURTH CENTURY.

In 1827, there was found by Mr. William Bankes at Stratonicea (now Eskihissar), in Asia Minor, part of a table of stone, inscribed with an edict of Diocletian, published A. D. 303, fixing the price of labor and food in the Roman empire; the second part of which table was brought from Rome to London by M. de Vescovali.

Of this precious archæological document M. Moreau de Jonnes has formed a table, whence we quote a few of the mean prices in English

money. *Price of labor:* a day-laborer, 4*s.* 8*d.*; for interior works, a mason, or maker of mortar, 9*s.* 4*d.*; a marble-cutter, or mosaic cutter, 11*s.* 4*d.*; a tailor, 9*s.* 4*d.*; for making shoes for the patricians, £1 8*s.* 1*d.*; for the military, or senators, 18*s.* 8*d.*; for currycombing and cleaning a horse, 3*s.* 9*d.* To an advocate, for a petition, £2 6*s.* 9*d.*; for the hearing of a cause, £9 7*s.* 6*d.* *Wines*, the English pint: Sabine, Surrentine, and Falernian, 5*s.* 4*d.*; old wines, first quality, 4*s.* 2¾*d.*; spiced wine of Asia, 5*s.* 4*d.*; beer of Egypt, 2*d.* *Meat*, per lb.: beef or mutton, 2*s.*, lamb, kid, or pork, 3*s.*; lard, 4*s.*; belly of tripe, 4*s.*; Westphalia ham, 5*s.*; pig's liver, fattened on figs, 4*s.*; pork-sausages, two weighing 1 oz., 4½*d.* *Poultry and game:* fat peacock, £2 6*s.* 9*d.*; fat peahen, £1 17*s.* 9*d.*; a fat goose, £2 16*s.* 9*d.*; lean goose, 18*s.* 8*d.*; a hen, 11*s.* 4*d.*; a duck, 7*s.* 4*d.*; a partridge, 5*s.* 8*d.*; a hare, £1 8*s.* 1*d.*; a rabbit, 7*s.* 4*d.* *Fish:* sea, 4*s.* 6*d.* each; river, half price. *Vegetables:* cabbages and cauliflowers, 9*d.* each; beet-roots, 5*s.* 9*d.* Honey, best, was 15*s.* per lb.; vinegar, 2*s.* 3*d.* per pint; and dried cheese, 3*s.* 4*d.* per lb. From this document we gather that two-thirds, or even three-fourths of the Roman people, were reduced to live on fish and cheese, and drink piquette, when the expense of the table of Vitellius amounted in a single year to 475 millions of francs (19 millions sterling).

REDUCTION OF PRICES BETWEEN 1810 AND 1851.

Amid the innovations of this active time, it is very difficult to appreciate, as it deserves, the great social progress which has been made in defiance of all obstacles within the last forty years. The immense fall, for example, which has taken place in the cost of all articles of food and clothing that enter into the consumption of the working and middle, as also of the higher, classes, is in its effect equivalent to a social change of the most important kind. The London Athenæum furnishes the following differences in the cost of commodities in England in the year 1810, and in the year 1851. The price of a hat in 1810 was 20*s.*, and in 1851 it had fallen to 7*s.*;—or if a laborer's weekly wages had been paid for in hats, he would have had three times as great a supply in the present year as he had forty years ago. A gown cost 21*s.* in 1810, and only 6*s.* in 1851. Calico was 2*s.* 9*d.* a yard against 6*d.* at present. Tea was 8*s.* per lb. against 4*s.* now. Brown sugar was 10*d.*, now 4*d.* Salt was 18*s.* per bushel, and has fallen to 1*s.* A bushel of flour was 20*s.* in 1810, and 5*s.* in 1851. In reply to these facts, it may be said that the rate of money wages has fallen with money prices. This assertion is difficult of proof. In some few cases

money wages have declined; but as a general result, they have not declined in the same ratio as money prices. Therefore the condition of the people is materially improved, inasmuch as the real or commodity price of labor of the English working classes is probably as much as one-half or three-fourths better than it was in 1810.

THE VALUE OF IRON.

To show how cheaply iron is obtained, and how the mechanical skill and labor expended upon it totally overshadow the price, a number of the "British Quarterly Review" gives the following curious and instructive calculation:

	£	s.	d.
Bar iron, worth £1 sterling, is worth, when worked into horseshoes,	2	10	0
Table knives,	36	0	0
Needles,	71	0	0
Penknife blades,	657	0	0
Polished buttons and buckles,	897	0	0
Balance springs of watches,	50,000	0	0
Cast iron, worth £1 sterling, is worth, when converted into machinery,	4	0	0
Larger ornamental work,	45	0	0
Buckles and Berlin work,	600	0	0
Neck chains,	1,386	0	0
Shirt buttons,	5,896	0	0

Thirty-one pounds of iron have been made into wire, upwards of one hundred and eleven miles in length, and so fine was the fabric, that a part was converted, in lieu of horse-hair, into a barrister's wig. The process followed, to effect this extraordinary tenacity, consists of heating the iron and passing it through rollers of eight inches diamter, going at the rate of four hundred revolutions per minute, down to No. 4 on the gauge. It is afterwards drawn cold, down to No. 38 on the same gauge, and so on, till it obtains the above length in miles.

WHAT IS THE ANNUAL WASTE OF IRON ON A FARM?

The London *Mark Lane Express* publishes the following communication from an eminent English ironmaster and agriculturist, in answer to the question, "*What is the annual waste of iron per acre in the cultivation of land?*"—the answer being based upon the careful examination of the accounts of a farm in Bedfordshire, England. The farm consists of 330 acres of arable land and 120 acres of meadow or permanent grass. The following is the list of the implements employed upon it:

6 Iron ploughs,
2 Ridging ploughs,
2 Double furrow ploughs,
1 Broad share plough,
1 Clod crusher,
1 Iron and 3 wood cylinder rollers,
4 Sets of iron harrows,
2 Scarifiers or cultivators,
8 Sets of iron whiffletrees,
1 Land marker,
1 Corn drill,
1 Liquid drill,
1 Turnip drill,
1 Grass seed drill,
1 Liquid manure cart,
1 Water cart,
1 Liquid manure pump,
1 Weighing machine and weights,
1 Horse rake,
1 Hay-making machine,
1 Reaping machine,
2 Horse hoes,
10 Carts,
1 Wagon and 1 van,
1 Steam engine,
1 Combined threshing machine,
1 Flour mill,
1 Linseed mill,
1 Bean splitter,
2 Chaff machines,
1 Cake breaker,
2 Winnowing machines,
1 Corn blower,
1 Barley hummellor,
4 Turnip cutters and pulpers,
20 Iron troughs,
Shepherd's field-house,
Sheep racks and cribs,
Hand tools, chains, &c.

The estimated weight of iron in these implements is 20 tons, and to it there may be added at least 4 tons for iron work in farm buildings, gates, &c. The estimated annual consumption of iron in order to keep these implements good is about 6½ cwt., or rather more, per annum of wrought iron, and 7 cwt. of cast iron. The number of horses kept is 14; each of them on an average uses 32 shoes per annum, weighing about 2 lbs. each of them; about one-eighth are lost, and the average weight of the old shoes worked up is about ¾ lb. each. From these data it is calculated that nearly 5½ cwt. of wrought iron are annually used in horse shoes alone. This makes the total consumption of wrought iron 12 cwt., and of cast iron 7 cwt. per annum. We are not informed as to the quality of the soil—the number of horses would lead one to suppose it heavy—but from their being spoken of as "pairs," and from the use of double furrow ploughs, we suppose it to be light, and the latter is more probably the case.

On this farm in Bedfordshire, it appears that on 450 acres there is a consumption of rather more than 4 lbs. of iron per acre per annum. It must be remembered, however, that the relative proportions of arable and pasture on this farm are not those which obtain over the country generally, and that the stock of iron implements upon this farm very far exceeds the quantity generally in use. On both these grounds we have little doubt that in this experience there is nearly double the consumption of iron which generally obtains per acre; and, therefore, that this, over the country generally, ought to be assumed rather as being between 2 and 3 lbs. per acre yearly than as between 4 and 5.

ALL THE GOLD IN THE WORLD.

Estimate the yard of Gold at £2,000,000, which it is in round numbers; and all the gold in the world might, if melted into ingots, be contained in a cellar twenty-four feet square and sixteen feet high. All the boasted wealth already obtained from California and Australia would go into an iron safe nine feet square and nine feet high—so small is the cube of yellow metal that has set populations on the march, and roused the whole world to wonder.

The contributions of the people, in the time of David, for the Sanctuary, exceeded £6,800,000. The immense treasure David is said to have collected for the sanctuary amounted to £889,000,000 sterling (Crito says 798 millions)—a sum greater than the British National Debt. The gold with which Solomon overlaid the "most holy place," a room only thirty feet square, amounted to more than thirty-eight millions sterling.

STRENGTH OF BANK-NOTE PAPER.

Sheets were drawn at random from 500 sheets of each specimen, and their strength tested both lengthwise or by perpendicular strain, and crosswise or by transverse strain, also with and without sizing. The first experiment was with paper, weighing 14 lbs. to the ream. The first sheets used were each halved and weighed, each half sheet being folded double when tested. A half sheet weighing 3,165 grammes, having 64·81 square inches to support the strain, stood a perpendicular strain 20·5 lbs. Without sizing and weighing by its loss 3·070 grammes, it stood a strain of 100·5 lbs. For a transverse strain, a half sheet weighing 3·227 grammes, with 53·375 square inches, stood a strain 254·5 lbs. Without sizing and weighing 3·085 grammes, it stood the strain of 146·5 lbs.

For the second experiment, paper 14 lbs. to the ream was used. A half sheet as before, weighing 3·505 grammes, and offering 61 square inches to the strain, stood the strain of 120·5 lbs. Transverse, a half sheet weighing 3·180 grammes, with 53·375 square inches, stood a strain of 260·5 lbs. Without sizing and weighing 2·830 grammes, 105·5 lbs.

Experiment No. 3 was with paper weighing 16 lbs. to the ream. A half sheet weighing 45·86 grammes, with 61 square inches, stood a strain of 300.5 lbs. Without sizing and weighing 4·520 grammes, it stood a strain of 137·5 lbs. The average results of Crane's paper, 14 lbs. to the ream, with sizing, was an average perpendicular strain of 3·35 lbs. to the square inch, with an average of 3·151 grammes; and

an average transverse strain of 4·75 lbs. to the square inch, with an average of 8·134 grammes weight. Wilcox & Co.'s, with sizing 14 lbs. to the ream, stood an average perpendicular strain of 3·66 lbs. to the square inch, the average weight being 8·195 grammes; and a transverse strain of 4·81 lbs., with 2·991 grammes weight.—*Report to Association for the Suppression of Counterfeiting.*

THE NATIONAL DEBT OF ENGLAND.

Towards the middle of the seventeenth century, as the principle of credit came into use in the mercantile communities of Italy, Holland, and England, the governments of Europe gradually relinquished their old custom of extorting "benevolences," "aids," &c., from their people, and began to borrow money for public exigencies, binding the State to pay for what they borrowed a certain rate of interest per annum till the money was repaid, or the debt, to use the language of financiers, redeemed. From about that period all the governments of Europe have had small or large debts. Charles I. borrowed largely from his partisans; but all his debts were extinguished by the Revolution, and it was under his sons that the foundations of a permanent debt were laid in England. On the accession of William III. the Debt, however, was only £664,263, and the annual charge only £39,855. During his reign the system of credit was expanded throughout Europe: he was mainly supported by the moneyed classes and townspeople; his throne was not founded on hereditary right, he could not, like the Stuarts and the Tudors, extort from the people at his will; and he accordingly defrayed a large part of the annual expenditure by borrowing money, and pledging the State to pay annual interest on it. At the end of William's reign, the Debt was £15,730,439, and the annual charge on account of it £1,271,087. From his time the same process has been continued. In all exigencies, such as war, the large payment on account of Negro Emancipation, the famine in Ireland, &c., the Government has borrowed money, and mortgaged its future revenue to pay the interest. In periods of peace, and when the rate of interest has been low, it has redeemed small portions of the Debt, or it has lowered the annual charge by reducing, with the consent of the holders, the rate of interest. The last change of this kind was when Mr. Gladstone paid off the debt of the South Sea Company in 1853–4, which he was obliged to do by his proposal to convert it not having been favorably received.

The annexed table, copied from Mr. McCulloch's edition of Smith's

Wealth of Nations, is an account of the progress of the Debt in outline, to which is added its amount at this time. The debt consists of several species of loans, or funds, with different denominations, which have been in process of time variously mixed and mingled, such as Consols, *i. e.* several different loans consolidated into one stock—3 per cents Reduced, New 3 per cents, &c. The unfunded debt consists of Exchequer bills issued from year to year, and continued or renewed by the Treasury, to supply temporary wants, bearing a rate of interest, corresponding to, but generally lower than, the rate of discount in the commercial money-market; and exchequer bonds, first issued by the Treasury in the beginning of 1854, which are loans at a fixed rate of interest for a short period, and then to be repaid.

The following is the account of the principal and annual charge of the Public Debt at different periods since the Revolution:

	Principal, funded and unfunded.	Interest and management.
Debt at the Revolution in 1689	£664,263	£39,855
Excess of Debt contracted during the reign of William III. above debt paid off,	15,730,439	1,271,087
Debt at the accession of Queen Anne in 1702	16,394,702	1,310,942
Debt contracted during Queen Anne's reign	37,750,661	2,040,416
Debt at the accession of George I. in 1714	54,145,363	3,351,358
Debt paid off during the reign of George I. above debt contracted	2,053,125	1,133,807
Debt at the accession of George II. in 1727	52,092,238	2,217,551
Debt contracted from the accession of George II. till the peace of Paris in 1763, three years after the accession of George III.	86,773,192	2,634,500
Debt in 1763	138,865,430	4,852,051
Paid during peace from 1763 to 1775	10,281,795	380,480
Debt at the commencement of the American war in 1775	128,583,635	4,471,571
Debt contracted during the American war	121,267,993	5,033,336
Debt at the conclusion of the American war in 1784	249,851,628	9,500,907
Paid during peace from 1784 to 1793	10,501,380	249,277
Debt at the commencement of the French war in 1793	239,350,148	9,311,630
Debt contracted during the French war	601,500,343	22,704,311
Total funded and unfunded debt on the 1st of February, 1817, when the English and Irish exchequers were consolidated	840,850,491	32,015,941
Debt cancelled from 1st February, 1817, to 5th January, 1849,	59,033,152	3,894,319
Total debt and charge thereon 5th January, 1849,	791,817,339	28,121,622

Between 1849 and 1854 there was a continual reduction of debt. The total amount accordingly on the 1st of April, 1854, was £768,664,249, viz., £752,655,549 funded debt, and £16,008,700 unfunded debt. In 1854 the debt was again augmented by loans to carry on the war, and again in 1855.

The following is an exact statement of its amount, taken from the finance returns, on March 31, 1855, before the additional debt for the year was contracted:

	Capital.	Annual charge, including expense of management.
Total funded (£751,645,819), and unfunded debt (Exchequer bills £17,151,400, Exchequer bonds £6,000,000), on March 31st, 1855	£ 774,797,219	£ 27,800,708

VALUE OF DIAMONDS.

Mr. Tennant, in a paper read to the London Society of Arts, states that diamonds are generally weighed by the carat, which is equivalent to 4 grains. A diamond of

1 carat	is	worth	$40*	10 carats	is	worth	$1,500
2 "		"	80	20 "		"	16,000
3 "		"	360	30 "		"	36,000
4 "		"	640	50 "		"	100,000
8 "		"	1,000	100 "		"	400,000

CURIOSITIES OF THE AMERICAN CENSUS.

From the statistics collected under the seventh census of the United States, the following interesting facts have been deduced:—

1. *Law of Growth.*—This has been so uniform that the general ratio is a well-known fact; but the mode in which that growth has been made is very little known. Many persons have given too much weight to immigration, and others have supposed the increase of the African race more rapid than it is. Mr. Darby, in his "View of the United States," gave the law of population to the year 1940, which, although published twenty years ago, gave the population of 1850 but a million and a half beyond what it is; and the whole error was in the estimate of the African race, which he made 5,700,000, when it is really but 3,636,000. There has been a tendency at all times to exaggerate the increase and importance of the African as well as the immigrant population.

The numbers of inhabitants prior to the Revolution cannot be obtained with accuracy; but since 1780 we have it with great exactness. The law of growth has, for sixty years, been but slightly variant from 34 per cent. This is so fixed and certain, that allowing for a very little diminution of ratio, we may assume 33 and one-third per cent. (or one-third the existent population) as the decimal increase of growth for the next half century. We may predict, with almost cer-

* The pound is here called five dollars.

tainty, that in 1910 (sixty years) the American Republic will have one hundred and twenty millions of people.

2. *The Law of Numerical Relation between the Sexes.*—There is a natural law of relations between the sexes, which is found to vary at different ages, according to the different dangers to which they are exposed. This is one of the most curious of the natural laws, and one of the most interesting—demonstrating the admirable economy of adaptations between the several parts of the natural system. If the number of males and females born was exactly equal, the result would be, that, before they reached middle age, the female sex would be reduced too low, and become inadequate to the purposes which it has to fill. In fact, the number of the males born is always greater than the females by about four per cent. To illustrate the changes in the numerical relations perfectly, take the following example from the last two censuses:

In 1840, under five years of age,........	1,270,750	males.
In 1840, under five years of age,........	1,203,347	females.
Excess (5½ per cent.)...........	67,441	males.
In 1850, under five years of age,.........	1,472,052	males.
In 1850, under six years of age,.........	1,424,325	females.
Excess (4 per cent.)............	47,727	males.

Now let us pass on to the age of puberty, and see what a change has taken place:

In 1850, from 15 to 20 years,............	1,087,600	females.
In 1850, from 15 to 20 years,............	1,041,116	males.
Excess (4 per cent.)............	46,484	females.

The females have now passed the males; but let us go on and see what influence motherhood has had on females:

In 1850, from 30 to 40 years,............	1,288,682	males.
In 1850, from 30 to 40 years,............	1,128,257	females.
Excess (14 per cent.)..........	160,425	males.

At 70 years of age, the females are again in advance, and the same fact is developed in each census. Above we see an immense change in the relation. From birth to 20 years the loss of males to females

by death was nearly 2 to 1; but from 20 to 40, the death of females was much the greatest, so that the males are again the most numerous. Past 40, the deaths of females are the smallest. The numerical law of the sexes, then, is this:—

1st. There are more males than females born by about 4 per cent. 2d. At 20 years of age, this preponderance is entirely lost, and there are more females than males. 3d. At 40 years, the balance is again the other way, and there are more males than females. 4th. At 70, the sexes are about even, and the ultimate age of the human being is reached without any decided advantage to either sex. Between 70 and 100 years of age, there are 15,311 more white women than there are males: being more than 5 per cent. of the whole number. Beyond the age of 40 years, the probabilities of longevity are much greater for American women, than that of men. This contrasts singularly with the fact that the "physique" (relatively) of American women is inferior to that of American men. That fact, however, tells tremendously on women between the ages of 20 and 40 when their mortality is very great.

3. *The growth of the White Race.*—The ratio of increase, at each successive decennial period, has been respectively 36, 37, 35, 35, 35, 38 per cent. This gives us a decennial growth of about 36 per cent. for the white race. The growth of the white race is, therefore, decennially, about 2 per cent. greater than the growth of the whole; consequently, leaving a diminution, to a corresponding extent, in that of the colored population.

4. *The growth of the African Race.*—The colored race have advanced, decennially, very nearly as 37, 32, 30, 29, 25, 27 per cent.

5. *The Law of Relation in the growth of the Races.*—As seen in the preceding paragraphs, the growth of the white race exceeds that of the colored race, by nearly ten per cent., in the corresponding ratio. But, we must remark, it seems, that the conditions of their growth are not parallel. The white race is continually receiving accessions from Europe. In the last ten years (1840 to 1850) the United States received about 1,500,000 white immigrants. Of these, about 600,000 died in the ten years; so that 900,000 of the nearly 20,000,0000 of white population were immigrants thus added to the natural increase. The actual increase of whites was about 5,000,000, from which, deducting 900,000 immigrants, leaves 4,100,000 for the national increase, which is about 28½ per cent. In the same time the growth of the African race was 27 per cent.; so that, in fact there is a very little difference between the ratios of natural increase in the

two races, although there is some difference, and that in favor of the whites.

6. The General Law of Increase, (independent of immigration), by natural causes alone, is 28 per cent. decennially. This is eight per cent. below the average increase of the whites, and ten per cent. below that from 1840 to 1850. While the number of born foreigners in the United States is less than 9 per cent., the number in the comparative increase of a single year is large, rising, in the last two or three years, to about half the whole increase. The original immigrants, however, rapidly die, while their children are born on the soil.

BRITISH RAILWAYS AND TELEGRAPHS,

Spread like a network over Great Britain and Ireland, to the extent of 8054 miles completed. Thus in length, they exceed the ten chief rivers of Europe united, and more than enough of single rails are laid to make a belt of iron around the globe. The cost of these lines has been £286,000,000, equal to one-third of the amount of the National debt. The railway works have penetrated the earth with tunnels to the extent of more than 50 miles. There are 11 miles of viaduct in the vicinity of the metropolis alone—the earth works measure 550,000,000, of cubic yards, which would form a pyramid a mile and a half in height, with a base larger than St. James's Park. Eighty millions of train miles are run annually on the railways, 5000 engines, and 150,000 vehicles compose the working stock; the engines, in a straight line, would extend from London to Chatham; the vehicles from London to Aberdeen: and the companies employ 90,400 officers and servants; whilst the engines consume annually 2,000,000 tons of coals, so that in every minute of time 4 tons of coal flash into steam 20 tons of water, an amount sufficient for the supply of the domestic and other wants of the town of Liverpool. The coal consumed is almost equal to the whole amount exported to foreign countries, and to one half of the annual consumption of London. In 1854, 111,000,000 of passengers were conveyed on railways; each passenger travelled an average of 12 miles. The old coaches carried an average of 10 passengers, and for the conveyance of 300,000 passengers a day 12 miles each, there would have been required at least 10,000 coaches and 120,000 horses. The receipts of the railways in 1854 amounted to £20,215,000, and there is no instance on record in which the receipts of a railway have not been of continuous growth, even where portions of its traffic have been abstracted by competition or new lines. The wear and tear is great; 20,000 tons of iron require to be replaced annually; and

9*

26,000,000 of sleepers annually perish; 300,000 trees are annually felled to make good the loss of sleepers; and 300,000 trees can be grown on little less than 5000 acres of forest land. The acts of Parliament which railways have been forced to obtain, cost the country £14,000,000 sterling,—the exclusive fault of Parliament itself, and of the system it enforced. The legislation of Parliament has made railways pay 70,000,000 of money to landowners for land and property; yet almost every estate traversed by a railway has been greatly improved in value. At least 7200 miles of Telegraph, or 36,000 miles of wires have been laid down. Three thousand people are continually employed, and more than a million of public messages are annually flashed along the "silent highway." To the working of railways the telegraph has become essential. The needle is capable of indicating at every station whether the line is clear or blocked, or if accident has anywhere occurred. The telegraph can, therefore, do the work of additional rails, by imparting instantaneous information to the officers, and enabling them to augment the traffic over those portions of the line to which their duty might apply. It also enables large savings to be effected in rolling stock, by affording the means of supplying such stock at any station at which it is needed, from some other station where it has accumulated, and is not wanted. As a perpetual current is passing through the wires, the guard or engine driver has only to break the train wire in case of accident, and the officers at the nearest station are instantaneously apprised that something is wrong and that assistance is needed. The business of the Electric Telegraph Company has increased fifty-fold in seven years. Railway accidents occurred to passengers, in the first half of 1854, in the proportion of one accident to every 7,195,348 travellers. The results of railways are astounding: 90,000 men are employed directly, and upwards of 40,000 collaterally—130,000 men, with their wives and families, represent a population of 500,000 souls; so that 1 to 50 of the entire population of the kingdom might be said to be dependent on railways! The annual receipts of railways now reach £20,000,000, or nearly half the amount of the ordinary revenue of the State. If railway intercourse were suspended, the same amount of traffic could not be carried on under a cost of £60,000,000 per annum; so that £40,000,000 a year are saved by railways. To the public "time is money," and in point of time, a further saving is effected; for on every journey averaging 12 miles in length, an hour is saved to 111,000,000 of passengers per annum, which is equal to 38,000 years in the life of a man working eight hours a day; and allowing an average of 3*s*. per diem for his work, this ad-

ditional saving was £2,000,000 a year. Every farthing saved, on the train mileage of the kingdom, is £80,000 a year gained to railway companies.—ROBERT STEPHENSON'S *Address to British Institution of Civil Engineers.*

RAILWAY SPEED.

The ordinary rate of speed is per second, of a man walking, 4 feet; of a good horse in harness, 12; of a reindeer in a sledge on the ice, 26; of an English race-horse, 43; of a hare, 88; of the wind, 82; of sound, 1038; of a 24-pound canon ball, 1800. These calculations are taken from a French writer. The comparison might be carried with advantage a little farther. A railway engine, travelling at the ordinary rate of 30 miles an hour, performs 44 feet per second, which is eleven times the speed of a man walking, nearly four times that of the good horse, twice that of the reindeer, and only about one-half less than that of the wind itself. But man, horse, and reindeer, all soon become exhausted; while the locomotive is as fresh and strong at the end of a long journey as at first starting: miles to it are but as paces to others.

ILLUSTRATIONS OF LOCOMOTIVE SPEED.

Dr. Lardner, in his lately published Economy of Railroads, thus endeavors to convey to the unpractised reader the enormous speed of a locomotive going at the rate of seventy miles an hour: "Seventy miles an hour is, in round numbers, 105 feet per second, that is, a motion in virtue of which a passenger is carried over thirty-five yards between two beats of a common clock. Two objects near him, a yard asunder, pass by his eye in the thirty-fifth part of a second; and if thirty-five stakes were erected by the side of the road, one yard asunder, the whole would pass his eye between two beats of a clock; if they had any strong color, such as red, they would appear a continuous flash of red. At such a speed, therefore, the objects on the side of the road are not distinguishable. When two trains, having this speed, pass each other, the relative velocity will be double this, or seventy yards per second; and if one of the trains were seventy yards long, it would flash by in a single second. To accomplish this, supposing the driving-wheels seven feet in diameter, the piston must change its direction in the cylinder ten times in a second. But there are two cylinders, and the mechanism is so regulated that the discharges of steam are alternate. There are, therefore, twenty discharges of steam per second, at equal intervals; and thus these twenty puffs divide a second into

twenty equal parts, each puff having the twentieth of a second between it and that which precedes and follows it. The ear, like the eye, is limited in the rapidity of its sensations; and, sensitive as that organ is, it is not capable of distinguishing sounds which succeed each other at intervals of the twentieth part of a second. According to the experiments of Dr. Hutton, the flight of a cannon ball was 6,700 feet in one quarter of a minute, equal to five miles per minute, or 300 miles per hour. It follows therefore, that a railway train, going at the rate of 75 miles per hour, has the velocity of one-fourth that of a cannon ball; and the momentum of such a mass, moving at such a speed, is equivalent to the aggregate force of a number of cannon balls equal to one-fourth of its own weight.

TWENTY-ONE YEARS' RETROSPECT OF THE RAILWAY SYSTEM.

The greatest speed of Trevithick's engine was five miles an hour. The ordinary speed of George Stephenson's Killingworth engine, in 1814, was four miles an hour. In 1825, Mr. Wood, in his book on railways, takes the standard at six miles an hour, drawing forty tons on a level; and so confident was he that he had gauged the power of the locomotive, that he thinks it right to say, "that nothing could do more harm towards the adoption of railways than the promulgation of such nonsense, as that we shall see locomotive engines travelling at the rate of 12, 16, 18 and 20 miles an hour." The promulgator of such nonsense was George Stephenson. In 1829, it was estimated that at 15 miles an hour the gross load was nine tons and a half, and the net load very little, and that therefore, high speed, if attainable, was practically useless. Before the end of that year, George Stephenson got with the Rocket a speed of 29½ miles per hour, carrying a net load of 9½ tons. In 1831 his engines were able to draw 90 tons on a level at 20 miles an hour. When the speed of the locomotive was set beyond question, prejudice then took alarm about the safety, and a very strong stand has from time to time been made for limitation of speed. Within the last seven years the London and Birmingham directors considered 20 miles an hour was enough. We recollect the simple unbelief, when it was announced that Brunel had run a locomotive at the rate of a mile a minute, and when at length it was known to be true, it was said that it was not safe, and would never do, and yet it has since then been made a working speed. Thirty miles an hour was thought progress—an express at 35 miles an hour seemed to have reached the furthest limits, but, in 1846, Brunel succeeded in working the express to Bristol in two hours and a half, and to Exeter in

four hours. Trevithick's greatest net load was ten tons, that of Stephenson's first engine 30 tons. In 1825, the net load was forty tons, in 1831, ninety tons, now 1,200 tons. These greater effects of the locomotive have been caused by an increase in the size of the parts, and a greater effective power. Trevithick's cylinder was 8 inches in diameter, and he had only one cylinder. Brunton's cylinder was six inches in diameter. Stephenson's first locomotive had two cylinders, each of eight inches diameter. In 1829, the Rocket had two cylinders, each of one inch diameter. The Sans Pareil had two cylinders, each of seven inches in diameter: in 1831, the cylinders were enlarged to ten inches and twelve inches diameter. In 1832, the Samson, a powerful engine, had cylinders of fourteen inches diameter. Since then cylinders have been increased to fifteen inches and eighteen inches diameter, as in the Great Western locomotive. The immense increase of power may be inferred from these measurements. In 1829, the heating surface was about 100 square feet. It was soon increased to 200, and then 300 square feet, afterwards to 400, 500, 800, and 1,000 square feet. The fire-box surface in the Rocket was 20 square feet, in the broad gauge engines it has been increased to above 100 square feet.

The weights of the engines have necessarily increased. Brunton's leg locomotive, in 1813, weighed 2½ tons. In 1825, engines weighed 5 tons, but some with the tender weighed 10 tons. In 1829, the Rocket weighed 4½ tons, the tender weighed 3 tons 4 cwt., the total being under 7½ tons. The weight of the engines has been increased to 8 tons, 10 tons, 12 tons, and so up to the Leviathan engine of 29 tons on the Great Western. The rails have become heavier with the weights of the engines. On the Stockton and Darlington, in 1821, they were not more than 28 lbs. to the yard. On the Liverpool and Manchester, in 1829, they were laid down at 35 lbs. to the yard. They were successively increased to 50 lbs. and 65 lbs. The London and Birmingham was originally intended for rails of 64 lbs. to the yard; but on Mr. Barlow's report, they were increased to 75 lbs.; since then rails of 85 lbs. to the yard have been laid down on some lines. On the other hand, the consumption of fuel has diminished. Before 1829 the consumption of fuel was about 5 lbs. to carry one ton a mile; in that year George Stephenson reduced it to 2·41 lbs. of coke. It would scarcely be credited, that it can now be brought to less than a quarter of a pound per ton per mile. The gradients overcome have been steeper. Less than ten years ago, a gradient of one in one hundred and fifty was considered as impassable, except by means of a station-

ary engine. A gradient of one in thirty-seven can now be managed with the locomotive. The rates for goods have in many cases been reduced one half, in some cases even to a greater extent; while there is a tendency in the progress of the railway system to a greater reduction. To show, in a clearer light, the difference between railways and locomotives in 1804, 1822, and 1846, we have drawn up the following comparisons:

1804,	weight of rails,	28 lbs.;	weight of engine,	—
1829,	"	35 "	"	4½ tons.
1846,	"	85 "	"	29 "

		Miles			Miles.
1804,	highest speed,	5	per hour;	working speed	2½
1829,	"	29½	"	"	10
1846,	"	75	"	"	55

		Inches.		Tons.
1804,	diameter of cylinder	8	greatest net load,	9
1829,	"	8	"	40
1846,	"	18	"	1200

1829,	fire-box surface,	20 sq. ft.;	heating surface,	117 ft.
1846,	"	108 "	"	1000 "

COMPARATIVE COST OF PADDLE WHEEL AND SCREW STEAMERS.

With respect to economy it appears that the original cost of paddle-wheel steamers, when fit for sea, is about £5 9*s.* per ton greater than that of screw steamers, and that their current expenses for the year are about £8 per ton more than those of screw vessels. At the same time the average measure of cargo for screw steamers is three-fourths of a ton for each ton of builder's measure, whilst for paddle-wheel steamers it is less than half a ton, or 33 per cent. less than the former. Others state the saving at fully two-thirds the cost of each voyage.—*Captain Washington's Lecture before Society of Arts.*

EXTENT OF COAST OF THE DIFFERENT CONTINENTS.

The extent of coast in Europe is about 17,000 miles; in Asia, 33,000; in Africa, 16,000; in America, 31,000. Thus it appears that the ratio that the number of linear miles in the coast-line bears to that of square miles in the extent of surface, in each of these great portions of the globe, is 164 for Europe, 376 for Asia, 530 for Africa,

and 359 for America. Hence the proportion is most favorable to Europe, with regard to civilization and commerce; America comes next, then Asia, and last of all Africa, which has every natural obstacle to contend with, from the extent and nature of its coasts, the desert character of the country, and the unwholesomeness of its climate, on the Atlantic coast at least.—*Somerville's Physical Geography.*

ANCIENT AND MODERN ENGLISH MILE.

Professor De Morgan in an elaborate article in the Penny Cyclopædia proved that the old English mile, as spoken of in Leland's Itinerary, and other ancient works, was in round numbers about equal to one and a half of the modern standard miles. This should be borne in mind in reading old books and documents.

NOAH'S ARK A MODEL SHIP.

The largest ocean steamships now plying on the Atlantic, bear precisely the proportions in length, breadth, and depth, that are recorded concerning Noah's Ark. The dimensions of the Atlantic steamers are: length, 322 feet; breadth of beam, 50 feet; depth, $28\frac{1}{2}$ feet. The dimensions of the Ark were: length, 300 cubits; breadth, 50 cubits; depth, 30 cubits. The Ark, therefore, was nearly twice the size in length and breadth, of these vessels, the cubit being twenty-two inches; both had upper, lower, and middle stories. After all the equipments of forty-two centuries, which have elapsed since the Deluge, the shipbuilders have to return to the model afforded by Noah's Ark.—*Sailor's Magazine.*

PROGRESS OF NAVIGATION.

Lieutenant Maury has in his possession the log-book of a West India trader in 1746, which shows that her average rate of sailing per log, was about one mile the hour. The instruments of navigation then were rude: chronometers were unknown, and lunars were impracticable; it was no uncommon thing for vessels in those days, when crossing the Atlantic, to be out of their reckoning 5°, 6°, and even 10° and when it was announced that a vessel might know, by consulting the water thermometer, when she crossed the eastern edge of the Gulf Stream, and again when she crossed the western edge, navigators likened the discovery to the drawing of blue and red streaks in the water, by which they might, when crossed, be able to know their longitude. The merchants of Providence, R. I., when Dr. Franklin was

in London, sent a petition to the Lords of the Treasury, asking that the Falmouth (England) packets might run to Providence instead of Boston; for they maintained that, though Boston and Falmouth were between Providence and London, yet that, practically, they were much further apart; for they showed that the average passage of the London traders to Providence was fourteen days less than that of the packet line from Falmouth to Boston. Dr. Franklin, on being questioned as to this fact, consulted an old New England captain, who had been a whaler, and who informed the Doctor that the London traders to Providence were commanded for the most part by New England fishermen, who knew how to avoid the Gulf Stream, while the Falmouth packets were commanded by Englishmen, who knew nothing about it. These two drew a chart, which was published at the Tower, and the Gulf Stream, as laid down by that Yankee whaler, has been preserved upon our charts until within a few years. The influence of the Gulf Stream thus becoming known through the influence of Dr. Franklin, and the discovery of the water thermometer, the course of trade formerly setting towards Charleston, S. C., was diverted to the Northern ports. This revolution commenced about 1795. It worked slowly at first, but in 1816–17 it received a fresh impulse from Jeremiah Thompson, Isaac Wright, and others, who conceived the idea of establishing a line of packets between New York and Liverpool. This was a period when the scales of commercial ascendency were vibrating between New York, Boston, Philadelphia, and other places. The packet ships of Thompson turned the balance. Though only of 800 tons burden, and sailing but once a month, they had their regular day of departure, and the merchants of Philadelphia, Charleston, &c., found it convenient to avail themselves of this regular and stated channel, for communicating with their agents in England, ordering goods, &c., and from that time the commerce of New York has gone on steadily increasing.

PERIOD OF HUMAN LIFE.

M. Flourens, the distinguished French physiologist, and Perpetual Secretary of the Paris Academy of Sciences, has published a work, in which he announces that the normal period of the life of man is "one hundred years." The grounds on which he comes to this new philosophic conclusion may be briefly stated. It is, we believe, a fact in natural history, that the length of each animal's life is in exact proportion to the period it is in growing. Buffon was aware of this truth, and his observations led him to conclude that the life in different spe-

cies of animals is six or seven times as long as the period of growth. M. Flourens, from his own observations, and those of his predecessors, is of opinion that it may be more safely taken at five times. When Buffon wrote, the precise period at which animals leave off growing, or, to speak more correctly, the precise circumstance which indicates that the growth has ceased, was not known. M. Flourens has ascertained that period, and thereon bases his present theory: "It consists," says he, "in the union of the bones to their epiphyses. As long as the bones are not united to their epiphyses the animal grows: as soon as the bones are united to their epiphyses the animal ceases to grow." Now, in man, the union of the bones and the epiphyses takes place, according to M. Flourens, at the age of twenty; consequently, he proclaims that the natural duration of life is five times twenty years. "It is now fifteen years ago," he says, "since I commenced researches into the physiological law of the duration of life, both in man and in some of our domestic animals, and I have arrived at the result that the normal duration of man's life is one century. Yes, a century's life is what Providence meant to give us." Applied to domestic animals, M. Flourens' theory has, he tells us, been proved correct. "The union of the bones with the epiphyses," he says, "takes place in the camel at eight years of age, and he lives forty years; in the horse at five years, and he lives twenty-five years; in the ox at four years, and he lives from fifteen to twenty; in the dog at two years, and he lives from ten to twelve years; and in the lion at four years, and he lives twenty." As a necessary consequence of the prolongation of life to which M. Flourens assures man he is entitled, he modifies very considerably his different ages. "I prolong the duration of infancy," he says, "up to ten years, because it is from nine to ten that the second dentition is terminated. I prolong adolescence up to twenty years, because it is at that age that the development of the bones ceases, and consequently the increase of the body in length. I prolong youth up to the age of forty, because it is only at that age that the increase of the body in bulk terminates. After forty the body does not grow, properly speaking; the augmentation of its volume which then takes place, is not a veritable organic development, but a simple accumulation of fat. After the growth, or more exactly speaking, the development in length and bulk has terminated, man enters into what I call the period of invigoration, that is—when all our parts become more complete and firmer, our functions more assured, and the whole organism more perfect. This period lasts to sixty-five or seventy years, and then begins old age, which lasts for thirty years." To those

who may be disposed to ask, why is it, that of men destined to live a hundred years, so few do so, M. Flourens answers triumphantly— "With our manners, our passions, our torments, man does not die; he kills himself!"

AVERAGE OF HUMAN LIFE.

The average of human life is about 33 years. One quarter die previous to the age of seven years; one half before reaching 17; and those who pass this age enjoy a felicity refused to one half the human species. To every 1,000 persons, only one reaches 100 years of life; to every 100, only six reach the age of sixty-five; and not more than one in 500 lives to eighty years of age. There are on earth 1,000, 000,000 inhabitants; and of these 333,333,333 die every year, 91,824 every day, 3,730 every hour, and 60 every minute, or one every second. These losses are about balanced by an equal number of births. The married are longer lived than the single; and, above all, those who observe a sober and industrious conduct. Tall men live longer than short ones. Women have more chances of life in their favor previous to being fifty years of age than men have, but fewer afterwards. The number of marriages is in proportion of 75 to every 1,000 individuals. Marriages are more frequently after the equinoxes; that is, during the months of June and December. Those born in the spring are generally more robust than others. Births and deaths are more frequent by night than by day.—*Quarterly Review.*

OCCURRENCE OF DEATH AT DIFFERENT DAILY PERIODS.

The hours most fatal to life are thus determined by a writer in the *London Quarterly Review*, from the examination of the facts in 2,880 cases:—If the deaths of the 2,880 persons had occurred indifferently at any hour during the 24 hours, 120, it might be supposed, would have occurred at each hour. But this was by no means the case. There were two hours in which the proportion was remarkably below this, two minima in fact, namely, from midnight to 1 o'clock, when the deaths were 33 per cent below. From 3 to 6 o'clock A. M. inclusive and from 3 to 7 o'clock P. M., there is a gradual increase, in the former of 23½ per cent. above the average, in the latter of 5½ per cent. The maximum of death is from 5 to 6 o'clock A. M., when it is 40 per cent. above the average; the next, during the hour before midnight, when it is 24 per cent. in excess; a third hour of excess is that from 9 to 10 o'clock in the morning, being 18½ per cent. above. From 10 A. M. to 3 P. M. the deaths are less numerous, being 16½ per cent.

below the average, the hour before noon being the most fatal. From 8 o'clock P. M. to 9 the deaths rise to 5½ per cent. above the average, then fall from that hour to 11 P. M., averaging 6¼ per cent. below the mean. During the hours from 9 to 11 o'clock in the evening, there is a mininum of 6¼ per cent. below the average. Thus the least mortality is during the mid-day hours—namely, from 10 to 8 o'clock; the greatest during early morning hours, from 8 to 6 o'clock. About one-third of the total deaths were children under five years of age, and they show the influence of the latter more strikingly. At all hours, from 10 o'clock in the morning until midnight, the deaths are at or below the mean; the hours from 4 to 5 P. M. and from 9 to 10 P. M. being minima, but the hours after midnight being the lowest maximum: at all the hours from 2 to 10 A. M. the deaths are above the mean, attaining their maximum at from 5 to 6 o'clock A. M., when it is 45¼ per cent. above.

DEATHS BY WAR AND PESTILENCE.

In 1855 there were issued by the Board of Health some tables showing the comparative loss of life by War and by Pestilence. It appears that in 22 years of war there were 19,796 killed, and 79,709 wounded; giving an annual average of 899 killed, and 3,623 wounded. —In 1848–49 there were no fewer than 72,180 persons killed by cholera and diarrhœa in England and Wales, and 144,360 attacked; 34,397 of the killed were able-bodied persons capable of getting their own living! Besides these deaths from the great epidemic, 115,000 die annually, on an average, of preventible diseases; while 11,419 die by violence. Comparing the killed in nine great battles, including Waterloo (4,740), with the number killed by cholera in London in 1848–49 (14,139), we find a difference of 9,399 in favor of war. In cholera visitations, 12 per cent. sometimes 20 per cent. of the medical men employed, died. The London missionaries die as fast as those in foreign countries; and there are some districts in London which make the Mission Society ask themselves whether they have a right to send men into them. From the returns of 12 unions it is found that 3567 widows and orphans are chargeable to the cholera of 1848-9, entailing an expenditure of £121,000. in four years only.

The highest ratio of loss in any attack made by large fleets will be found in Lord Exmouth's bombardment of Algiers, where the casualties reached 147 per 1,000; but the historian James asserts, that, in the official returns relating to the attack upon Copenhagen, the slightly wounded were not included, and that the total number of casualties

was 1,200. If the historian's statement be admitted, the total loss in that action must have been at the rate of 150 per 1,000, which would be greater than at Algiers.—*W. B. Hodge.*

It appears that the total number of deaths in the cholera-year (1849), for all England and Wales, was 440,839; but in 1850 the number of deaths fell to 368,995, "being not only 71, 844 less than-in the cholera-year, but even less than the number of deaths of the year preceding that of the cholera, by as many as 30,838. . . . . If we take the deaths of the two years together which preceded the cholera, and strike the mean, and treat the year of the cholera, and the compensating year that follows, in the same manner, we shall find that the four years present nearly the same average. . . . . So that in reality it is found, when the aggregate of the four years is taken, either for the whole of England, or for the metropolis only, that no greater number of people died in those years because of the cholera intervening than if the cholera had not visited us."—Dr. GRANVILLE, *in the Medical Times and Gazette.*

LONGEVITY IN GREAT BRITAIN.

In Great Britain more than half a million of the inhabitants (596,030) have passed the barrier of "threescore years and ten;" more than a hundred and twenty-nine thousand have passed the Psalmist's limit of "fourscore years;" and 100,000 the years which the last of Plato's climacteric square numbers expressed (9 times 9—81); nearly ten thousand (9,847) have lived 90 years or more; a band of 2,038 aged pilgrims have been wandering ninety-five years and more on the unended journey; and 319 say that they have witnessed more than a hundred revolutions of the seasons.

It is strange to reflect upon a few of the great events that have occurred during the lengthened span of a Centenarian. Thus, a journalist, in recording the death of one John M'Innes, at Strontulla, near Oban, in the parish of Kilmore, at the age of 105 years, remarks: "At the time of his birth the wounds of Culloden were still unhealed, and the half of the Highlands looked on George II. as a usurper. M'Innes was a stout lad when Wolfe fell on the heights of Abraham; he was in his prime while the United States of America were still English colonies; and he was comparatively an old man before Napoleon Bonaparte was heard of. Steam navigation was only introduced after he had completed his 65th year.

RESPIRATION OF GREAT BRITAIN.

From observations and experiments by Mr. Coathupe and others, the following details may be relied on: 460,800 cubic inches, or 266·66 cubic feet of air pass through the lungs of a healthy adult of ordinary stature in twenty-four hours, of which 10·666 cubic feet will be converted into carbonic acid gas—2,386·27 grains, or 5·45 ounces (avoirdupois) of carbon. This gives 96·6 grains of carbon per hour produced by the respiration of one human adult, or 124,328 pounds annually; and if we multiply this by 26½ millions (being the calculated population of Great Britain and Ireland in the year 1839), we have 147,070 tons of carbon as the annual product of the respiration of human beings then existing within the circumscribed boundaries of Great Britain and Ireland.—*Philosophical Magazine.*

STATISTICS OF SUICIDE AND CRIME.

From an analysis of the criminal returns of the metropolitan police, it is apparent that crimes have their peculiar seasons. Thus attempts to commit suicide generally occur in the months of June, July and August, and rarely in November according to the commonly accepted notion. Common assaults and drunkenness also multiply wonderfully in the dog-days. In the winter, on the contrary, burglaries increase, and, for some unknown reason, the uttering of counterfeit coin.—*London Quarterly Review, July* 1856.

WEIGHT AND STATURE OF MEN OF DIFFERENT COUNTRIES.

	lbs. av.
The mean weight in Belgium (Brussels) and the environs is	140·49
In France (Paris and neighborhood) the man is .	136·89
The mean weight of the Englishman (taken at Cambridge) from 18 to 25	150·98

(In carriages it is usually considered that it averages 165 lbs.)

The mean height of the Belgian male is . 5 ft. $6\frac{3}{16}$ in.

	ft.	in.
The mean height of the Frenchman is . . .	5	4
Ditto Englishman . . .	5	9½

In recruiting for the French army the standard is now fixed at 1·566 meters of height, which is about 5 feet 1½ inches English. Fifty years ago, however, the French standard height was 5 feet 4 inches English.

The English standard is for the Foot Guards 5 feet 6 inches.

STATISTICS OF SILKWORMS.

24,000 eggs of the silkworm weigh a quarter of an ounce; the worm lives from 45 to 53 days; it increases in weight in 30 days 9,500 fold. and during the last 28 days of its life eats nothing. For

739 lbs. of mulberry-leaves, 70 lbs. of cocoons are obtained; 100 lbs. of cocoons give $8\frac{1}{2}$ lbs. of spun silk; and one pound of cocoons will produce a single thread of 88,000 fathoms in length.—BERGER.

FECUNDITY OF FISH.

A codfish has been found to produce 3,686,760 eggs or spawn; and a ling, 19,248,625. Herrings, weighing from four ounces to five and three-quarters, from 21,285 to 36,960. Mackerel, 20 ounces, 454,061. Soals, of five ounces, 38,772; one of fourteen ounces and a half, 100,362. A flounder of two ounces, 133,407; one of twenty-four ounces, 1,357,403; lobsters, from fourteen to thirty-six ounces, contain 21,699; a prawn, about 3,800; and a shrimp, from 2,800 to 6,800. —DR. MAUNDER.

RATE AT WHICH THE WINGS OF INSECTS MOVE.

The buzzing and humming noises produced by winged insects are not, as might be supposed, vocal sounds. They result from sonorous undulations imparted to the air by the flapping of their wings. This may be rendered evident by observing that the noise always ceases when the insect alights on any object. The sirene has been ingeniously applied for the purpose of ascertaining the rate at which the wings of such creatures flap. This instrument being brought into unison with the sound produced by the insect, indicates, as in the case of any other musical sound, the rate of vibration. In this way it has been ascertained that the wings of a gnat flap at the rate of 15,000 times per second. The pitch of the note produced by this insect in the act of flying is, therefore, more than two octaves above the highest note of a seven-octave pianoforte. The wings of some insects are so thin, that 50,000 placed one upon the other would not form a heap of more than a quarter of an inch in height.

COMMERCIAL VALUE OF INSECTS.

The importance of insects, commercially speaking, is scarcely ever thought of. Great Britain does not pay less than $1,000,000 for the dried carcases of the tiny insect, the Cochineal; and another Indian insect which, by puncturing particular trees, affords *Lac*, is scarcely less valuable. More than 1,500,000 human beings derive their sole support from the culture and manufacture of silk; and the silkworm alone creates an annual circulating medium of nearly $200,000,000; $500,000 are annually spent in England alone for

foreign honey; at least 10,000 cwt. of wax is imported into that country every year. Then there are the gall-nuts of commerce, used for dyeing and making ink, &c., the Cantharides or Spanish fly, &c. &c.

NUMBER OF SPECIES AND INDIVIDUALS IN THE ANIMAL KINGDOM.

The number of Vertebrated Animals may be estimated at 20,000. About 1,500 species of Mammals are pretty precisely known, and the number may probably be carried to about 2,000. The number of Birds well known is 4,000 or 5,000 species, and the probable number is 6,000. The Reptiles number about the same as the Mammals—1,500 described species—and they will probably reach the number of 2,000. The Fishes are more numerous; there are from 5,000 to 6,000 species in the Museums of Europe, and the number may probably amount to 8,000 or 10,000. The number of Molluscs already in collections, probably reaches 8,000 or 10,000. There are collections of marine shells, bivalve and univalve, which amount to 5,000 or 6,000; and collections of land and fluviatile shells, which count as many as 2,000. The total number of Molluscs would, therefore, probably exceed 15,000 species. Among the articulated animals, it is difficult to estimate the number of species. There are collections of coleopterous insects which number 20,000 to 25,000 species, and it is quite probable that by uniting the principal collections of insects, 60,000 or 80,000 species might now be counted; for the whole department of articulata, comprising the crustacea, cirrhipeda, the insects, the red-blooded worms, the intestinal worms, the infusoria, as far as they belong to this department, the number would already amount to 100,000; and we might safely compute the probable number of species actually existing at double that sum. Add to these about 10,000 for radiata, echini, star-fishes, medusæ, and polypi, and we have about 250,000 species of living animals; and supposing the number of fossil species to equal them, we have at a very moderate computation, half a million species. —AGASSIZ & GOULD's *Zoology*.

An opinion has been of late years very frequently expressed by high authorities, that the making of new genera and species has been carried to excess, and that many existing genera and species will, on further examination, be found to be identical.

DIVISIBILITY OF MATTER.

Many years ago, a curious calculation was made by Dr. Thompson, to show to what degree matter could be divided, and still be sensible

to the eye. He dissolved a grain of nitrate of lead in 500, 000 grains of water, and passed through the solution a current of sulphuretted hydrogen, when the whole liquid became sensibly discolored. Now a grain of water may be regarded as equal to a drop of that liquid, and a drop may be easily spread out so as to cover a square inch of surface. But under an ordinary microscope the millionth of a square inch may be distinguished by the eye. The water, therefore, could be divided into 500,000,000,000 parts. But the lead in a grain of nitrate of lead weighs 0·62 grains; an atom of lead cannot weigh more than 1,310,000,000,000th of a grain, while the atom of sulphur, which, combined with the lead, rendered it visible (in the mass?), could not weigh more than 1-2,015,000,000; that is, the two billionth part of a grain. But what is a billion, or, rather, what conception can we form of such a quantity? We may say that a billion is a million of millions, and can easily represent it thus: 1,000,000,000,000. But a school-boy's calculation will show how entirely the mind is incapable of conceiving such numbers. If a person were able to count at the rate of 200 in a minute, and to work without intermission twelve hours in a day, he would take, to count a billion, 6,944,944 days, or 19,025 years 319 days. But this may be nothing to the division of matter. There are living creatures so minute, that a hundred millions of them may be comprehended in the space of a cubic inch. But these creatures, until they are lost to the sense of sight, aided by the most powerful instruments, are seen to possess organs fitted for collecting their food, and even capturing their prey. They are, therefore supplied with organs, and these organs consist of tissues nourished by circulating fluids, which must consist of parts or atoms, if we please so to term them. In reckoning the size of such atoms, we must not speak of billions, but perchance of billions of billions. And what is a billion of billions? The number is a quadrillion, and can be easily represented thus: 1,000,000,000,000,000,000,000,000; and the same schoolboy's calculation may be employed to show that to count a quadrillion, at the rate of 200 a minute, would require all the inhabitants of the globe, supposing them to be a thousand millions, to count incessantly for 19,025,875 years, or more than 3,000 times the period for which the human race has been supposed to be in existence.

HOW MANY SEEDS TO THE POUND.

The following table shows the number of the seeds of the most common plants contained in a pound avoirdupois, and the number of pounds in a bushel:

Name.	No. of seeds. per lb.	No. of pounds. per bushel.
Wheat	10,500	58 to 54
Barley	15,400	48 to 46
Oats	20,000	33 to 42
Rye	23,000	56 to 60
Canary grass	54,000	.. to ..
Buckwheat	25,000	48 to 55
Turnip, Rendle's Swede	155,000	50 to 56
" Cornish Holdfast	230,000	50 to 56
" Orange Jelly	133,000	50 to 56
Cabbage, Scotch Drumhead	128,000	56
Cabbage, Drumhead Savoy	110,000	50 to 56
Clover, red	249,600	60
Clover, white	686,400	59 to 62
Rye-grass, perennial	314,000	26 to 28
Rye-grass, Italian	272,000	13 to 18
Sweet Vernal grass	923,200	8

RAINY DAYS IN THE YEAR.

In general, the number of rainy days is greatest near the sea, and decreases in proportion the further we penetrate into the interior. On the eastern side of Ireland, it rains 208 days of the year; in the Netherlands on 170; in England, France, and the North of Germany, and in the Gulf of Finland, on from 152 to 155 days; on the plateau of Germany on 131; and in Poland on 158 days; while on the plains of the Volga, at Kasan, it rains on 90, and in the interior of Siberia, only on 60 days of the year. In Western Europe it rains on twice as many days as in Eastern Europe; in Ireland on three times as many days as in Italy and south of Spain.—JOHNSON'S *Phys. Atlas.*

ORIGIN OF GAUGING.

We owe this to accident. On the occasion of Kepler's second marriage, he found it necessary to stock his cellar with a few casks of wine. When the wine-merchant came to measure the casks, Kepler objected to his method as he had made no allowance for the different sizes of the bulging parts of the cask. From this accident Kepler was led to study the subject of gauging, and to write a treatise on it, published at Lintz in 1615, which contains the earliest specimens of the modern analysis.—SIR D. BREWSTER'S *Martyrs of Science.*

DROP MEASURE.

Nothing is more fallacious than measuring fluids by dropping; since the drops from the lip of a vial vary, chiefly according to the different force of the attraction of cohesion in different liquids. Thus 60 drops of water fill the same measure as 100 drops of laudanum from a lip of the same size. The graduated glass measure used by apothecaries is the only certainty.

FACTS ABOUT GRAIN MEASURES.

There is no uniform measure by which grain is sold in Great Britain. In London, wheat and corn are sold by the quarter of 480 pounds, equal 8 bushels of 60 lbs. In Liverpool, wheat is sold by the bushel of 70 lbs. and corn by the quarter of 480 lbs. English flour is sold by the sack of 280 lbs.; American by the barrel of 196 lbs., every barrel weighed, and 20 lbs. deducted for tare. Gloucester, Glasgow, Cork, and other markets, each has its own peculiar measure—bushels of 62 or 64 lbs., bolls of 240 lbs., barrels, sacks, stones—a perfect confusion of weights and measures. The duty on wheat and other grain in Great Britain is 1 shilling (24 cents) on flour, 4½ pence on 112 lbs. In France, the hectolitre of wheat is (decimally) 2.85 bushels. In Amsterdam, the last is 83.37 bushels; in Dantzic, 87.15 bushels; in Rostock, 105.71 bushels. In Odessa, the chetwork is 6.06 bushels; in Petersburg, 5.49 bushels. The Swedish tonne is 3.97 bushels; the Danish 4.74 bushels. The Spanish fanega is 1.62 bushels; the Lisbon alquire, 41 bushels. The tomalo of Naples is 1.57 bushels; the emine of Genoa, 3.34 bushels; the Leghorn sack, 2 bushels.

A quarter of wheat is an English measure of 8 standard bushels; so if you see that quoted at 56s., it is 7s. per bushel. A shilling is 24 cents; multiply by 7, and you have $1.68.

The above rule for ascertaining the value of a bushel of wheat conformably to English quotations, is tolerably correct, so far as regards the quotations which are confined to the English standard, or rather imperial bushel; but is incorrect, if applied to Liverpool quotations. It often occurs that when wheat is quoted at London at 40s. per quarter of 8 imperial bushels, it will rate at 6s. per bushel of 70 lbs. in Liverpool. The London price current usually quotes wheat at so much per quarter, (8 imperial bushels of 60 lbs. each,) and the Liverpool price current, almost invariably at so much per bushel of 70 lbs. The Liverpool local bushels being one sixth larger than the American or imperial bushel, it follows that when a bushel of wheat is quoted at 6s. per bushel of 70 lbs., it is equal only to 5s. 2d. per American or imperial

bushel of 60 lbs. Therefore if you see wheat quoted at 6s. per bushel in Liverpool, it will not do to multiply by 24, in order to ascertain the difference between the American and English prices. As applicable to Liverpool quotations, the rule should be thus: Deduct one-seventh from the Liverpool price per bushel, reduce the remainder to pence, and double the products for cents. Example:—A circular quotes wheat at 6s. per bushel of 70 pounds; 6—1-7=5s. 2d., or 62 d.; double for cents—$1 24 per bushel.

EVAPORATION AND CONDENSATION.

The total quantity of dew believed to fall in England is supposed to amount to five inches annually. The average fall of rain is about twenty-five inches. Mr. Glaisher states the amount of evaporation at Greenwich to have amounted to five feet annually for the past five years, and supposes three feet about the mean evaporation all over the world. On this assumption the quantity of actual moisture, raised in the shape of vapor, from the surface of the sea alone, amounts to no less than 60,000 cubic miles annually, or nearly 164 miles per day. According to Mr. Laidlay, the evaporation at Calcutta is about fifteen feet annually; that between the Cape of Good Hope and Calcutta averages in October and November nearly, three quarters of an inch daily: betwixt 40° and 20° in the Bay of Bengal it was found to exceed an inch daily. Supposing this to be double the average throughout the year, we shall, iustead of three have eighteen feet of evaporation annually; or, were this state of matters to prevail all over the world, an amount of three hundred and sixty thousand cubic miles of water raised in vapor from the ocean alone.

RAIN IN DIFFERENT PARTS OF THE GLOBE.

The quantity of rain diminishes as we advance from the equator to the poles. It decreases in ascending to high table lands. It increases from the coasts to the interior of continents, the western coasts being generally more rainy than the eastern ones. At the equator the quantity of rain which falls annually is 95 inches, and at Petersburg only 17. The heaviest rain falls between the tropics; and in Europe the rainy districts are in the Alps, the middle of Portugal, the Coast of Norway, the Coast of Ireland, and the northwest Coast of Scotland. At Cape Horn no less than 154 inches fall, while in several parts of the world there is no rain at all; these parts are called the rainless districts. In the Old World there are two such districts, the largest

including the desert of Sahara and Egypt in Africa, and in Asia, part of Arabia, Syria, and Persia. The other district of nearly the same superficial extent, lies between north latitude 30° and 50° and between 75° and 118° of east longitude, including Thibet, Gobi or Shama, and Mongolia. In the New World the rainless districts are of much less magnitude, occupying two narrow strips on the shores of Peru and Bolivia, and on the Coast of Mexico and Guatimala, with a small district between Trinidad and Panama on the coast of Venezuela.—*North British Review, May*, 1856.

SIZE OF EUROPEAN LIBRARIES.

The most valuable libraries in Europe, at present existing, are stated to contain printed books and manuscripts as follows; The Royal Library, Paris, 700,000 vols. and 80,000 MSS. The Bodleian Library, Oxford, 420,000 vols. and 30,000 MSS. The Royal Central, Munich, 500,000 vols. and 16,000 MSS. The Vatican, Rome, 100,000 vols. and 40,000 MSS. University, Göttingen, 300,000 vols. and 5,000 MSS. British Museum, 308,000 vols. and 22,000 MSS. Vienna, 350,000 vols. and 16,000 MSS. St. Petersburg, 400,000 vols. and 16,000 MSS. Naples, 300,000 vols. and 6,000 MSS. Dresden, 300,000 vols. and 2,700 MSS. Copenhagen 400,000 vols. and 20,000 MSS. Berlin, 250,000 vols. and 5,000 MSS. The foregoing being given in round numbers, it can only be regarded as comparatively correct; but it serves to convey some idea of the vastness of these collections as well as their relative magnitudes.—DR. MAUNDER.

LOSS OF MEAT IN COOKING.

That, in whatever way the flesh of animals is prepared, a considerable diminution takes place in its weight, has long been known; but considerable error prevails as to the respective loss of weight. The following are the results of a set of experiments, which were actually made in a public establishment, not from mere curiosity, but to serve a purpose of practical utility. 28 pieces of beef, weighing 280 lbs., lost in boiling 73 lb. 14 oz. Hence, the loss of beef in boiling was about 20½ lb. in 100 lb.: 19 pieces of beef, weighing 190 lb., lost in roasting 61 lb. 2 oz. The weight of beef lost in roasting appears to be 32 lb. per 100 lb. Nine pieces of beef, weighing 90 lb., lost in baking 27 lb. Weight lost by beef in baking is 30 lb. per 100 lb. Twenty-seven legs of mutton, weighing 260 lb., lost in boiling and by having the shank-bones taken off, 62 lb. 4 oz. The shank-bones were estimated at 4 oz. each, therefore the loss in boiling was 55 lb. 8 oz.

The loss of weight in boiling legs of mutton is 21 lb. per 100 lb. Thirty-five shoulders of mutton, weighing 350 lb., lost in roasting 109 lb. 10 oz. The loss of weight of mutton in roasting was 31⅓ lb. per 100 lb. Sixteen loins of mutton, weighing 141 lb., lost in roasting 49 lb. 14 oz. Hence loins of mutton lose by roasting about 35½ lb. per 100 lb. Ten necks of mutton, weighing 100 lb., lost in roasting 22 lb. 6 oz. From the foregoing statement, two practical inferences may be drawn: 1st, In respect of economy, it is more profitable to boil meat than to roast it. 2d, Whether we roast or boil meat, it loses by cooking from one-third to one-fifth of its whole weight.—*Philosophical Magazine.*

THE PHYSICAL SCIENCES.

NICETY REQUIRED IN ASTRONOMICAL CALCULATIONS.—CURIOUS RESULTS OF MINUTE ERRORS.

The rod used in measuring a base line is commonly somewhere about ten feet long; and the astronomer may be said truly to apply that very rod to mete the distance of the stars. An error in placing a fine dot which fixes the length of the rod, amounting to one five-thousandth of an inch (the thickness of a single silken fibre) will amount to an error of seventy feet in the earth's diameter, of 316 miles in the sun's distance, and to 65,200,000 miles in that of the nearest fixed star. The astronomer in his observatory has nothing further to do with ascertaining lengths as distances, except by calculation, and his whole skill and artifice are exhausted in the measurement of angles; for it is by these alone that spaces inaccessible can be compared. Happily, a ray of light is straight; were it not so (in celestial spaces at least), there were an end of our astronomy. Now, an angle of a second (3,600 to a degree) is a subtle thing. It has an apparent breadth utterly invisible to the unassisted eye, unless accompanied with so intense a splendor (as in the case of the fixed star), as actually to raise by its effect on the nerve of sight a spurious image having a sensible breadth. A silkworm's fibre, such as we have mentioned above, subtends an angle of a second, at 3½ feet distance: a cricket ball, 2½ inches in diameter, must be removed, in order to subtend a second, to 43,000 feet, or about eight miles, where it would be utterly invisible to the sharpest sight, aided even by a telescope of some power. Yet

it is on the measure of one single second that the ascertainment of a sensible parallax in any fixed star depends; and an error of the one-thousandth of that amount (a quantity still unmeasurable by the most perfect of our instruments) would place the star too far or too near by 200,000,000,000 miles: a space which light requires 118 days to travel.

NATURE OF THE EARTH.

Its polar and equatorial diameters differ by only 26½ miles; and the greater of the two—the equatorial—is 7925 miles. Hence our excavations are mere scratches of the exterior only; for our deepest mines have never penetrated lower than to the ten-thousandth part of the distance between the earth's surface and its centre. As far as scientific researches enable us to conjecture, we should conclude that when *our earth was first set in motion* it must have been somewhat soft, in order to have produced its present undoubted spheroidal form. But *what is the real nature of the earth's interior?* Transcendental mathematics fully recognize the principle of interfluidity of fusion; while all actual observations point to the existence of heat in a greater degree the lower we go. The inferences of geological observation teach us that at only thirty-five miles distance from the earth's surface, "the central heat is every where so great, that *granite itself is held in fusion!*"

SURFACE OF THE EARTH ILLUSTRATED.

The inequalities on the earth's surface arising from mountains, valleys, buildings, &c., have been likened to the roughness on the rind of an orange, compared with its general mass; and the comparison is quite free from exaggeration. The highest mountain known does not exceed five miles in perpendicular elevation: this is only 1-1600th part of the earth's diameter; consequently, on a globe of sixteen inches in diameter, such a mountain would be represented by a protuberance of not more than one-hundredth part of an inch, which is about the thickness of ordinary drawing-paper. Now, as there is no entire continent, or even any very extensive tract of land, known, where the general elevation above the sea is any thing like half this quantity, it follows, that if we would construct a correct model of our earth, with its seas, continents, and mountains, on a globe sixteen inches in diameter, the whole of the land, with the exception of a few prominent points and ridges, must be comprised on it within the thickness of thin writing-paper: and the highest hill would be represented by the smallest visible grain of sand.—Sir John Herschel.

MAGNITUDE OF THE EARTH.

The circumference of the globe is twenty-five thousand and twenty miles. It is not so easy to comprehend so stupendous a circle as to put down its extent in figures. It becomes more palpable perhaps, by comparison such as this: A railway train, travelling incessantly, night and day, at the rate of twenty-five miles an hour, would require six weeks to go round it. The cubical bulk of the earth is two hundred and sixty thousand millions of cubic miles. Dr. Lardner says: "If the materials which form the globe were built up in the form of a column, having a pedestal of the magnitude of England and Wales, the height of the column would be nearly four and a half millions of millions of miles. A tunnel through the earth from England to New Zealand would be nearly eight thousand miles long."

WEIGHT OF THE EARTH.

Copernicus first distinctly demonstrated that the apparent terrestrial plain was really a free and independent material mass moving in a definable path through space. Then Newton explained that this independent mass moved through space because it was substantial and heavy, and because it was unsupported by props and chains; that, in fact, as a massive body, it is falling for ever through the void; but that, as it falls, it sweeps round the sun in a never-ending circuit, attracted towards it by magnet-like energy, but kept off from it by the force of its centrifugal movement. Next, Snell and Picard measured the dimensions of the heavy and falling mass, and found that it was a spherical body, with a girdle of 25,000 miles. Subsequently to this, Baily contrived a pair of scales that enabled him approximately to weigh the vast sphere; and he ascertained that it had within itself somewhere about 6,049,836 billions tons of matter. To these discoveries Foucault has recently added demonstration to the actual senses of the fact, that the massive sphere is whirling on itself as it falls through space, and round the sun, so that point after point of its vast surface is brought in succession into the genial influence of its sunshine, an inverting atmosphere of commingled vapor and air is made to present clouds, winds, and rain, and the inverted surface to bear vegetable forms and animated creatures in great diversity. The world is, then, a large, solid sphere, invested with a loosened shell of transparent, elastic, easily moving vapor, and whirling through space within the domains of sunshine; so that by the combined action of the transparent mobile vapor and the stimulant sunshine, organized creatures

may grow and live on its surface, and those vital changes may be diffused, amongst which conscious and mental life stand as the highest results.

HOW BAILY WEIGHED THE EARTH.

The apparatus used by Baily for determining the weight of the earth (*i. e.* the scales), consisted of two small balls, about two inches in diameter, carried on a rod suspended by two wires at a small distance from each other. The positions of these balls were viewed from a distance by a telescope. When this was done, large balls of lead, which moved on a turning groove, were brought near the small balls. Observations were then made on the small balls again, and in every case the small balls were put into a state of vibration and moved towards the large balls. Now, knowing the size of the large balls, and their distance from the small balls, and knowing the size of the earth, and the distance of the small balls from its centre, the proportion of the attraction of the large balls on the small balls to the attraction of the earth on the small balls can be calculated; and from these results the mean density of the earth was found to be 5.67 times the density of water; that is, the average density of a cubic foot of the earth is more than 5½ times heavier than a cubic foot of water. Having ascertained this result, and which agreed very nearly with the observations of Cavendish in the Schehallien experiments, all we want to know is, how many cubic feet there are in the earth. Now, taking the dimensions of the earth, as deduced from our best experiments, there are 259,800 millions of cubic miles in the earth; each cubic mile contains 147,200 millions of cubic feet; and each cubic foot weighs 5.67 times a cubic foot of water, which weighs about 62 lbs.; therefore, a cubic foot of the earth weighs about 354 lbs.; and 6,049,836 billions of tons are the weight of the whole earth.

MOTION OF THE EARTH AROUND THE SUN.

The motion of the earth around the sun in round numbers is 68,305 miles per hour,—so that while we are reading, or cogitating upon this statement, we are at the same time whirling along at a velocity of more than a thousand miles a minute, and nineteen miles between two beats of a pendulum, or in a second of time. The motion of Mercury in its orbit is much greater, being upwards of 100,000 miles per hour. If we are disposed to regard this as a rapid motion round the sun, what must the inhabitants of Neptune, who travel only three and a

half miles a second, think of us, who are whirling round the sun at six times the speed of Neptune!

THE THREE MOTIONS OF THE EARTH.

The Earth is believed by all astronomers to have, at this moment, not two motions only, but *three!*—one round its axis, which we can make evident to the very eye; another round the sun; but what of the *third?* A most remarkable, and equally mysterious fact; that the sun and all his planets are moving with prodigious velocity through space at the rate of a hundred and fifty millions of miles a-year, towards a particular point in the heavens, a star [λ] in the constellation Hercules!

ANALOGY BETWEEN THE PLANET MARS AND THE EARTH.

The analogy between Mars and the earth is greater than between the earth and any other planet of the solar system. Their diurnal motion is nearly the same; the inclinations of their equators to the planes of their orbits, on which the seasons depend, are not very different; nor is the length of his year very different from ours, when compared with the years of Jupiter, Saturn, and Uranus. The earth, however, appears to be the more favored of the two; since water would not remain fluid even at the equator of Mars, and alcohol would freeze in his temperate zones. The force of gravity on his surface is about one tenth greater than at the surface of the earth; but his density is much less than that of the earth. A body which weighs one pound at our equator, would weigh only five ounces and six drachms at that of Mars; and were his course stopped, 121 days and 10 hours would elapse before he dropped upon the sun. Should sentient beings exist there, they see the sun's diameter less by one third than we do; and consequently the degree of light and heat they receive is less than that received by us in the proportion of 4 to 9, or rather less than 1 to 2; liable, however, to variations from the great eccentricity of his orbit. If their atmosphere be as dense as is supposed, they probably scarcely ever discern Mercury and Venus, which will appear to *borrow* on the solar rays: the earth and moon, however, will afford them a beautiful pair of planets alternately changing places with each other under horned or falcated phases, but never quite full, and not more than a quarter of a degree distant from each other.

* * * * * * * *

There is not a planet within the reach of our telescopes which presents an aspect so like that of the earth as Mars; whose surface, inde-

pendently of the changeable atmospheric influences, shows an appearance of well-defined seas and continents; and this was very especially the case in August, 1830, when the *geographical* lines of demarcation were so beautifully distinct that Sir John Herschel called attention to them, saying that he was able to make a tolerable map of the surface. The predominant brightness of the polar regions leads to the supposition, that the poles of Mars, like those of the earth, are covered with perpetual snow; and Sir William Herschel concluded, that the observable changes in luminosity and magnitude are connected with the summer and winter seasons in that planet. Sir John Herschel also remarks, that the brilliant polar spots are probably snow, as they disappear when they have been long exposed to the sun, and are greatest when just emerging from the long night of their polar winter. The latter astronomer, aided by the full power of the twenty-foot reflector, pronounced the seas to be of a greenish hue, resembling the color of our own; and the land of a red tint, perhaps owing to a quality in the prevailing soil, like that which our red sandstone districts would exhibit to an observer beholding the earth from the surface of Mars.

THE SOLAR SYSTEM ILLUSTRATED.

In order to convey to the mind of the reader a general impression of the relative magnitudes and distances of the parts of our system, "choose," says Sir John Herschel, "any well-levelled field or bowling-green. On it place a globe two feet in diameter, which will represent the sun; Mercury will be represented by a grain of mustard-seed, on the circumference of a circle 164 feet in diameter for its orbit; Venus, a pea, on a circle 284 feet in diameter; the earth, also a pea, on a circle of 430 feet; Mars, a rather large pin's head, on a circle of 654 feet; Juno, Ceres, Vesta, and Pallas, grains of sand, in orbits of from 1000 to 1200 feet; Jupiter, a moderate-sized orange, in a circle nearly half a mile across; Saturn, a small orange, on a circle of four-fifths of a mile; and Uranus, a full-sized cherry or small plum, upon the circumference of a circle more than a mile and a half in diameter. As to getting correct notions on this subject by drawing circles on paper, or, still worse, from those very childish toys called orreries, it is out of the question. To imitate the motions of the planets in the above-mentioned orbits, Mercury must describe its own diameter in 41 seconds; Venus in 4m. 4s.; the earth in 7m.; Mars in 4m. 48s.; Jupiter in 2h. 56m.; Saturn in 3h. 13m.; and Uranus in 2h. 16m."

IS THE SUN INHABITED?

If (says Arago) this question were simply proposed to me, Is the Sun inhabited? I should reply, that I know nothing about the matter. But let any one ask of me if the sun can be inhabited by beings organized in a manner analogous to those which people our globe, and I hesitate not to reply in the affirmative. The existence in the sun of a central obscure nucleus, enveloped in an opaque atmosphere far beyond which the luminous atmosphere exists is by no means opposed, in effect, to such a conception.

Sir William Herschel thought the sun to be inhabited. According to him, if the depth of the solar atmosphere in which the luminous chemical action operates should amount to a million of leagues, it is not necessary that the brightness at each point should surpass that of an ordinary aurora borealis. In any case, the arguments upon which the great astronomer relies, in order to prove that the solar nucleus may not be very hot, notwithstanding the incandescense of the atmosphere, are neither the only, nor the best, that might be adduced. The direct observation, made by Father Secchi, of the depression of temperature which the points of the solar disc experience wherein the spots appear, is in this respect more important than any reasoning whatever.

Dr. Elliott maintained, as early as the year 1787, that the light of the sun arose from what he called a dense and universal twilight. He further believed, with certain ancient philosophers, that the sun might be inhabited. When the Doctor was brought before the Old Bailey for having occasioned the death of Miss Boydell, his friends, Dr. Simmons, among others, maintained that he was mad, and thought that they could prove it abundantly by showing the writings wherein the opinions which we have just cited were found developed. The conceptions of a madman are in the present day generally adopted.—ARAGO's *Popular Astronomy*, vol. i., book xiv., chap. 29.

Sir John Herschel concludes that the sun is a planet abundantly stored with inhabitants; his inference being drawn from the following arguments:

On the tops of mountains of a sufficient height, at an altitude where clouds can very seldom reach to shelter them from the direct rays of the sun, we always find regions of ice and snow. Now, if the solar rays themselves conveyed all the heat we find on this globe, it ought to be hottest where their course is least interrupted. Again, our aeronauts all confirm the coldness of the upper regions of the atmosphere. Since, therefore, even on our earth, the heat of any situ-

ation depends upon the aptness of the medium to yield to the impression of the solar rays, we have only to admit that, on the sun itself, the elastic fluids composing its atmosphere, and the matter on its surface, are of such a nature as not to be capable of any excessive affection from its own rays. Indeed, this seems to be proved by the copious emission of them; for if the elastic fluids of the atmosphere, or the matter contained on the surface of the sun, were of such a nature as to admit of an easy chemical combination with its rays, their emission would be much impeded. Another well-known fact is, that the solar focus of the largest lens thrown into the air will occasion no sensible heat in the place where it has been kept for a considerable time, although its power of exciting combustion, when proper bodies are exposed, should be sufficient to fuse the most refractory substances.

NATURE OF THE SUN.

The most recent observations confirm the supposition that the Sun is a black, opaque body, with a luminous and incandescent atmosphere, through which the solar body is often seen in black spots, frequently of enormous dimensions. A single spot, seen with the naked eye, in the year 1843, was 77,000 miles in diameter. Sir John Herschel, in 1837, witnessed a cluster of spots including an area of 3,780,000 miles. The diameter of the sun is 770,800 geographical miles, or 112 times that of the earth; its volume is 1,407,124 times that of the earth, and 600 times that of all the planets; and its mass is 359,551 times greater than the earth's, and 738 times greater than all the planets.

UNDISCOVERED BODIES OF THE SOLAR SYSTEM.

Numerous as are the heavenly bodies visible to the naked eye, and glorious as are their manifestations, it is probable that in our own system there are great numbers as yet undiscovered. Just two hundred years ago this year, Huyghens announced the discovery of one satellite of Saturn, and expressed the opinion that the six planets and six satellites then known, and making up the perfect number of *twelve*, composed the whole of our planetary system. In 1729 an astronomical writer expressed the opinion that there might be other bodies in our system, but that the limit of telescopic power had been reached, and no further discoveries were likely to be made. The orbit of one comet only had been definitively calculated. Since that time the power of the telescope has been indefinitely increased; two primary

planets of the first class, ten satellites, and forty-three small planets revolving between Mars and Jupiter have been discovered, the orbits of six or seven hundred comets, some of brief period, have been ascertained;—and it has been computed that hundreds of thousands of these mysterious bodies wander through our system. There is no reason to think that all the primary planets, which revolve about the sun, have been discovered. An indefinite increase in the number of asteroids may be anticipated; while outside of Neptune, between our sun and the nearest fixed star, supposing the attraction of the sun to prevail through half the distance, there is room for ten more primary planets succeeding each other at distances increasing in a geometrical ratio. The first of these will, unquestionably, be discovered as soon as the perturbations of Neptune shall have been accurately observed; and with maps of the heavens, on which the smallest telescopic stars are laid down, it may be discovered much sooner.—EVERETT's *Address at the Dudley Observatory.*

HEAT OF THE MOON.

It is a not uncommon assertion in many treatises on science, that the rays of the moon are devoid of heat. This, however, is an error. The late eminent Italian philosopher, Melloni, proved beyond doubt, that the rays of the moon give out a slight degree of heat. He concentrated the rays with a lens, over three feet diameter, upon his thermoscopic pile, when the needle was found to deviate from 0° 6′ to 4° 8′, according to the phase of the moon.

WHAT IS THE HARVEST MOON?

About the time of the autumnal equinox, the Moon, when near her full, rises about sunset a number of nights in succession. This occasions a remarkable number of brilliant moonlight evenings; and as this is in England the period of Harvest, the phenomenon is called the Harvest Moon. The sun being then in Libra, and the moon, when full, being, of course, opposite to the sun, or in Aries, and moving eastwards in or near the ecliptic at the rate of about 13° per day, would descend but a small distance below the horizon for four or six days in succession,—that is, for two or three days before, and the same number of days after, the full; and would, consequently, rise during all these evenings, nearly at the same time, namely, a little before or a little after sunset, so as to afford a remarkable succession of fine moonlight evenings.

THE MOON.

Dr. Scoresby, in an account he has given of some recent observations made with the Earl of Rosse's telescope, said that with respect to the moon, every object on its surface of one hundred feet was now distinctly to be seen, and he had no doubt that under favorable circumstances it would be so with objects sixty feet in height. On its surface were craters of extinct volcanoes, rocks, and masses of stones almost innumerable. He had no doubt that if such a building as he was then in were upon the surface of the moon, it would be rendered visible by these instruments. But there were no signs of inhabitants such as ours, no vestige of architectural remains to show that the moon is or ever was inhabited by a race of mortals similar to ourselves. It presented no appearance which could lead to the supposition that it contained any thing like the green fields and lovely verdure of this beautiful world of ours. There was no water visible, not a sea, or river, or even the measure of the reservoir for supplying town or factory; all seemed desolate.

ON THE ROTATION OF THE MOON.

During the year 1856 considerable discussion occurred in scientific circles in Great Britain respecting the question, "Does the moon revolve on her axis, or not?"

The question was first started by a London gentleman somewhat favorably known for his literary, though not for his scientific attainments, by a communication in the London *Times*, in which he assumed the negative in defiance of all astronomers. He charged them with designating that a rotation which is no rotation. The very fact which leads astronomers to impute to the moon a rotary movement, was adduced as a proof that she does *not* rotate. He argued thus: "If the moon turned at all on her axis, a little consideration will show that all her surface would be successively shown to the earth, and that it is because she has *no* rotary motion at all, that one side only is seen by us. She performs precisely the same motion in relation to the earth, that a point on the tire of a wheel does to the box or axle, or that the round end of the minute-hand of a watch does to the pivot in the centre. It is easy to construct a small instrument similar to this, by fixing a ball on one end of a strip of wood to represent the earth, and fastened by a pivot serving as its axis, and on the other end a smaller ball, also fastened by a pivot. If the strip of wood be turned round on its pivot at the end representing the earth, the small ball

will exactly represent the moon, and will present the same face, through the whole of its revolution, to the large ball; but if the small ball be made to rotate on its axis ever so little, it will immediately present a change of face to the larger ball, and so would the moon to the earth."

The charge was met by a great outburst of counter-ridicule and indignation. A gentleman, who was an astronomer and a wag at the same time, said, "I beg to inform him that I live in the moon, and that as I walk round the earth in order to keep my weather-eye open, so as continually to have it in view, I am obliged to perform a rotation on my axis once a month. I tried the other plan long ago, by always keeping my face to the north as I made my rounds; but then I turned in succession my face, my left side, my back, and my right side to the earth. I soon, however, got a 'round robin' from the earth, requesting me to go upon the old plan; so I gave up the experiment." Another advised the accuser thus: "Let him walk round a circular table, with his face always turned towards its centre, and by observing that the objects which originally appeared on his right, will appear, on the completion of one half of his perambulations, to be on his left, he will probably be able to convince himself that he has been turning round a vertical axis."

But as the accuser refused to be beaten down by ridicule, numerous practical illustrations were suggested to his attention; some of which may be usefully transcribed. 1. "Suppose that a mariner's compass is fixed on the edge of a wheel placed in a horizontal position, and made to revolve about its axis. In this case the needle of the compass will always point in the same direction—namely, towards the north, and the index card that is fixed to it will be carried round by the motion of the wheel without any rotation about its own axis. But this is a very different motion from that of the moon; and, in fact, if the moon moved round the earth in a manner similar to that just described, all the parts of its surface would be in succession visible from the latter." 2. "Take a common compass, and place it at the extremity of one of the arms of a turnstile. When the turnstile has gone half round, look at the compass, and you will find that the northern end of the needle points to the south of the card. By the time the turnstile has got all the way round, the needle will again, as at first, point the north of the card. Now, here it is very plain that either the needle has moved on its axis round the card, or the card has performed a revolution on that which is the common axis of itself and the needle; the eye will inform us that the former is not the case, and therefore that the latter

must be." 3. "Take a cup and ball, and marking the latter at four opposite points with the letters N., S., E., and W., carry it, suspended by its string, round the flame of a candle. You will find that if N. be kept always to the north, the ball consequently remaining without axial motion, the light will fall in succession on W., S., and E., until it reaches N. again. But if you wish N. to be always illuminated, you must turn it continually towards the flame; in so doing, you will cause an axial rotation of the ball upon its string at each revolution which it performs round the candle." 4. "A body is said to have no rotary motion when any line drawn in it continually points in the same direction in space. If the moon had no rotation, a line drawn from her centre to any point on her surface would continually point towards the same place in the heavens—that is, towards the same fixed star. A body, on the other hand, is said to have a rotary motion about an axis, when any line drawn through that axis and at right angles to it gradually turns round, so as to point successively to all points of the heavens lying in a great circle." 5. "Take a disc of tin for the moon, hollowed a little on one side to make it balance easily on a strong needle stuck point upwards near the end of a bar of wood revolving horizontally. You can hold the disc with your finger while you turn the bar, so as to keep some mark upon the disc facing the axis on which the bar turns, and let it go just before you stop the motion of the bar. In the converse experiment you have only to turn the bar, leaving the disc alone; and then it will not revolve (except in its orbit), but will present all its circumference in succession to the axis of the bar—thus showing that an additional force was necessary to make the moon turn on its axis, besides turning round the earth."

At the meeting of the British Association in 1856, the subject was brought up by Dr. Whewell, who presented the following paper:—The moon's motion may be described, in one way among others, by saying that in each month she revolves about the earth nearly in one plane, turning always the same face to the earth. But a body rigidly fastened to a rigid radius which revolved about the earth nearly in one plane, would during that revolution turn always the same plane to the earth. Now, would such a body be described as revolving upon its axis during such a revolution? By many persons it would not be so described. But the moon is described by astronomers as revolving about her axis in the course of every month. What are the reasons for such a description? The reasons are briefly these:—1. The moon is not fastened to the earth rigidly nor fastened at all. 2. The moon

being thus detached, the reference of the moon to the earth as a centre of revolution is arbitrary. 3. The other celestial bodies which revolve about centres also revolve about their axes, and the rule regarding them as not revolving about their axes when they turn always the same face to the centre, would produce confusion: it would, for instance, compel me to say that the earth revolves upon her axis 365¼ times in a year, whereas with regard to the fixed stars she revolves 366¼ times. Also, when a body revolves about a centre turning always the same face to the centre, then is mechanical force required to make it so turn; but no mechanical force is required to make it remain parallel to itself while it revolves round a centre. 1. The moon is *not* fastened to the earth rigidly, as the ancients supposed when they invented the crystalline spheres as the mechanism by which the heavenly bodies revolve, and by which they are connected with one another; and as the body representing the moon is fastened to the body representing the earth in machines made by man. The moon in nature is entirely detached from the sun, and the fact of her turning the same face to the earth does not at all form the machinery of her monthly revolution. Hence it is ascribed to a separate motion, her monthly revolution on her axis. 2. The reference of the moon to the earth is *arbitrary*. The moon revolves about the earth, but she revolves about the sun also. She revolves about the sun *more* than about the earth; for when she is between the sun and the earth, her face is concave to the sun and convex to the earth's orbit. There are, in some respects, stronger reasons for regarding her as fastened to the sun than as fastened to the earth. But in truth she is not fastened at all; and the simplest way is to regard her as quite detached, and to consider her motion by which she turns her face different ways as quite separate from the motion by which she revolves about any centre. 3. The other celestial bodies also revolve about their axes, and especially the earth. All persons agree in thus expressing the fact in the case of the earth; and as there are 365 days in the year, the earth revolves 365 times on her axis with reference to the sun. By doing this, she revolves 366 times on her axis with reference to the fixed stars.

NUMBER OF STARS.

To our naked eye are displayed, it is believed, about 3000 Stars, down to the sixth magnitude; and of these only twenty are of the first, and seventy of the second, magnitude. Thus far the heavens were the same to the ancients as they are to ourselves. But within

the last two centuries our telescopes have revealed to us countless millions of stars, more and more astonishingly numerous the further we are enabled to penetrate into space! Every increase, says Sir John Herschel, in the dimensions and power of instruments, which successive improvements in optical science have attained, has brought into view multitudes innumerable of objects invisible before; so that, for any thing that experience has hitherto taught us, the number of the stars may be really infinite, in the only sense in which we can assign a meaning to the word. Those rendered visible, for instance, by the great powers of Lord Rosse's telescope, are at such an inconceivable distance, that their light, travelling at the rate of 200,000 miles a *second*, cannot arrive at our little planet in less time than *fourteen thousand years!* Fourteen thousand years of the history of the inhabitants of these systems, if inhabitants there be, had passed away during the time that a ray of their light was travelling to this tiny residence of curious little man! Consider for a moment, that that ray of light must have quitted its dazzling source *eight thousand years* before the creation of Adam!—SAMUEL WARREN.

DISTANCE OF THE EARTH FROM THE FIXED STARS.

The light of the sun takes 160 minutes to move to the Georgium Sidus, the remotest planet of our own solar system; and so vast is the unoccupied space between us and the nearest fixed star, that light would require *five years* to pass through it. But as the telescope has disclosed to us objects many thousand times more remote than such a star, the creation of a new star at so great a distance could not become known to us for many thousand years, nor its dissolution recognized for the same length of time. Had the fleet messenger that was charged with the intelligence of its birth, or its death, started at the creation of the world, he would, at the present time, be only nearing our own planetary system.—*North British Review.*

Sir John Herschel tells us, that there are stars so infinitely remote as to be situated at the distance of twelve millions of millions of miles from our earth: so that light, which travels with the velocity of twelve millions of miles in a minute, would require two millions of years for its transit from those distant orbs to our own; while the astronomer who should record the aspect of mutations of such a star, would be relating, not its history at the present day, but that which took place two millions of years gone by.

The nearest (*a Centauri*), one of the brightest stars in the southern

hemisphere, is at *twenty-one billions of miles* distance; that is, its light would require three years and a quarter to reach us. The second (61 *Cygni*) is not nearer than *sixty-three billions* of miles off, and its light requires upwards of ten years to reach us. These inconceivable distances have been measured to the utmost nicety, as the Astronomer Royal has explained, really by means of a common yard measure! But what proportion is there between even these monstrous distances and those of the stars discovered by the great powers of Lord Rosse's telescope, the power of which we have just illustrated?

THE VASTNESS OF CREATION.

But it is when we turn our observation and our thoughts from our own system, to the systems which lie beyond it in the heavenly spaces, that we approach a more adequate conception of the vastness of Creation. All analogy teaches us that the sun which gives light to us is but one of those countless stellar fires which deck the firmament, and that every glittering star in that shining host is the centre of a system as vast and as full of subordinate luminaries as our own. Of these suns—centres of planetary systems—thousands are visible to the naked eye, millions are discovered by the telescope. Sir John Herschell, in the account of his operations at the Cape of Good Hope, (p. 381,) calculates that about five and a half millions of stars are visible enough to be *distinctly counted* in a twenty-foot reflector in both hemispheres. He adds that "the actual number is much greater, there can be little doubt." His illustrious father estimated on one occasion that 125,000 stars passed through the field of his forty-foot reflector in a quarter of an hour. This would give 12,000,000 for the entire circuit of the heavens, in a single telescopic zone; and this estimate was made under the assumption that the nebulæ were masses of luminous matter not yet condensed into suns.

These stupendous calculations, however, form but the first column of the inventory of the Universe. Faint white specks are visible even to the naked eye of a practised observer in different parts of the heavens. Under high magnifying powers, several thousand of such spots are visible,—no longer, however, faint white specks, but many of them resolved by powerful telescopes into vast aggregations of stars, each of which may, with propriety, be compared with the milky way. Many of these nebulæ, however, resisted the power of Sir Wm. Herschell's great reflector, and were, accordingly, still regarded by him as masses of unformed matter, not yet condensed into suns. This,

till a few years since, was, perhaps, the prevailing opinion;—and the nebular theory filled a large space in modern astronomical science. But with the increase of instrumental power, especially under the mighty grasp of Lord Rosse's gigantic reflector and the great refractors at Pulkova and Cambridge, the most irresolvable of these nebulæ have given way; and the better opinion now is, that every one of them is a galaxy, like our own milky way, composed of millions of suns. In other words, we are brought to the bewildering conclusion that thousands of these misty specks, the greater part of them too faint to be seen with the naked eye, are, not each a universe like our Solar system, but each a "swarm" of universes of unappreciable magnitude. The mind sinks overpowered by the contemplation. We repeat the words, but they no longer convey distinct ideas to the understanding. —EVERETT'S *Address, Dudley Observatory.*

BINARY STARS.

We are now able to detect Binary, physically Binary stars; that is to say, a primary, with a companion continually revolving round it. "This," says Captain Smyth, "is the wonderful truth opened to view, that two suns, each self-luminous, and probably with an attendant train of planets, are gyrating around their common centre of gravity under the same dynamical laws which govern the solar system; that is, not precisely like our planets, round one great luminary, but where each constituent, with its accompanying orbs, revolves round an intermediate point or fixed centre! This is a great fact, and one which in all probability Newton himself never contemplated."

ON TWINKLING.

In a paper in the "Annuaire du Bureau des Longitudes," 1852, M. Arago has an interesting article on twinkling. He commences his inquiry by giving an exact definition of the term scintillation. He affirms that, in so far as naked eye observers of the heavens are concerned, scintillation, or twinkling, consists in very rapid fluctuations in the brightness of the stars.

These changes are almost always accompanied by variations of color and certain secondary effects, which are the immediate consequences of every increase of diminution of brightness: such as considerable alterations in the apparent magnitudes of the stars, and in the length of the diverging rays, which appear to issue in different

directions from their centres. It has been remarked from a very early age that the phenomenon of twinkling is accompanied by a change of color. M. Arago asserts further, that the twinkling of the planets is a well established fact. An impression has generally prevailed that the stars do not twinkle in telescopes, M. Arago, however, asserts that this opinion is erroneous. He maintains that the only satisfactory theory which can be advanced on the subject of twinkling, is that which connects the phenomenon with the principle of the interference of light. He illustrates the latter principle by the well-known experiment, in which two rays of light emanating in different directions from a luminous point, are made to converge again by being reflected from the surfaces of two mirrors, and to combine together, or to destroy each other, according to the conditions of the experiment. If the light from which the rays issue be homogeneous, and if the routes severally traversed by them be made to differ in length by gradually displacing one of the mirrors, the point where they meet after reflection will, in some positions of the movable mirror, exhibit a very vivid light, while in other intermediate positions it will appear quite black. The positions of the movable mirror corresponding to which the two rays thus alternately conspire together or destroy each other, will vary with the color of the spectrum employed in the experiment. It results from this important fact, that when rays of white light emanate from the luminous point, they will exhibit at their point of concourse after reflection, a succession of prismatic colors, depending, in each case, on the position of the movable mirror. It is found that similar effects may be produced, if instead of causing the routes of the two rays to differ in length, the refrangibility of the media through which they pass be subjected to a similar variation. It is upon these two facts that M. Arago has established his theory of scintillation. In the case of telescopic observations, he supposes that the rays of light which enter the telescope at opposite extremities of a diameter of the object-glass, may have traversed strata of the upper regions of the atmosphere, which, either from variations of density or temperature, or from hygromatic causes, may possess different refractive powers. It might happen from this cause, that the red rays at one extremity of the diameter, might totally destroy those at the opposite extremity of the diameter, and that the focus might pass from the normal color of white to that of green, the complementary color of red. In the next instant the green might be totally destroyed, and the color of the focus would, consequently, be ed; and similar effects might manifestly be produced each successive

instant, by the destruction now of one color and now of another color of the spectrum. Generally, the rays will only partially destroy each other by their interference; in which case the light will still be colored at the focus, although less intensely than if the destruction had been complete. M. Arago had already established by experiment, that if even the twentieth part of a pencil of light were extinguished by the interference of any of the homogeneous rays, the light at the focus would appear sensibly colored. It would, therefore, be sufficient that the strata of the atmosphere should, by reason of their unequal frangibility, affect intermittently, and in a suitable degree, the twentieth part of the rays which the surface of a lens embraces, in order that the focal point should acquire in succession the different prismatic colors. "Now," says M. Arago, "if we take into consideration the great length of the route traversed by the light from the superior limits of the atmosphere to the object-glass of the telescope; if we reflect, moreover, on the small difference of refrangibility which suffices to occasion the passage of two rays from the state of accord to that of destruction, and on the effect of winds, however moderate, bringing incessantly new atmospheric strata before the telescope, it cannot excite any surprise that in observing Sirius, a star sufficiently low in our latitudes, as many as thirty changes of color in a second have been noticed." Having thus explained, by the principle of the interference of light, the twinkling of the stars in telescopes, M. Arago finds no difficulty in applying the same explanation to observations with the naked eye. He then proceeds to show how the twinkling of the planets may be accounted for by the same principle, and he concludes the exposition of his views on this interesting subject by suggesting three different modes of measuring the scintillation of a star. The most interesting depends on an experiment, which is originally due to M. Arago himself, and which he first gave an account of in the year 1824. If a diaphragm be placed before the object-glass of a telescope, so as to allow the light to pass through a circular aperture, and if a star be observed with the telescope when the eye-piece is in the position of distinct vision, the image of the star will resemble a vascillating disc of light surrounded by alternate dark and bright rings. If the eye-piece be now gradually pushed in, there is a second position, in which the luminous disc in the centre will be replaced by a black hole surrounded by alternate bright and dark rings. By continuing to push the eye-piece towards the focus a third position will be found, in which the image will resemble that observed in the first instance; and thus a constant recurrence will take place as the eye-

piece is pushed forward, the image alternating between a luminous centre, surrounded by dark and bright rings, and a central dark hole surrounded by bright and dark rings. Now, to determine the second position of the eye-piece, viz: that in which the image of the star exhibits a dark hole in the centre, instead of observing the star directly, the eye-piece may be placed exactly midway between the first and third positions. If the telescope be now directed to a star which twinkles, the phenomenon will manifest itself in a succession of accidental reappearances of a luminous point in the dark hole, and these reappearances will be more numerous as the twinkling is stronger.—

THE SUN'S LIGHT COMPARED WITH TERRESTRIAL LIGHTS.

When we place the flame of a wax candle so that it is projected upon the regions of the atmosphere nearest the Sun's disc, it totally disappears, and we see merely the wick under the form of a black spot. This effect is still more strongly marked, as it ought to be, when the flame is projected upon the disc itself of the body. Whence we may deduce the conclusion, that the brightness of this flame is less that of a corresponding portion of the sun, than that of a corresponding portion of the surrounding atmosphere, and that it does not form even 1-30th of the latter. Now the intensity of the atmospheric light being 1-500th of the light of the sun in the vicinity of that body, we see that the intensity of the flame of a wax candle is only 1-30 × 1-500th, or the 15,000th part of the solar light.

The brightest light which man has been enabled to produce is that which has been named the electric light, which is engendered by the aid of the galvanic battery, the magnificent invention of Volta. It is no exaggeration to assert that the electric light is comparable to the solar light; for if we project upon the sun's disc the light which is obtained by rendering incandescent two pieces of charcoal placed in communication with the two poles of a galvanic battery, we do not arrive at all at the result which is furnished by a wax candle, or even a carcel lamp. The electric light is not effaced in presence of that of the sun. According to the energy of the battery employed, we find that the electric light varies from the fifth part to the fourth of that of the sun; or, in other words, that it is equivalent to that diffused by a number of wax candles varying between 3,000 and 3,750. Let us add, that a carcel lamp gives as much light as seven wax candles; and that the light of a jet of gas is equal to that of nine wax candles. The reader will be pleased to remark, that we speak only of the brightness of the

sun at the surface of the earth, and not of the intensity of the light of that body near its surface.—ARAGO's *Popular Astronomy*.

The direct light of the sun has been estimated to be equal to that of 5,570 wax candles of moderate size supposed to be placed at the distance of one foot from the object. That of the moon is probably only equal to the light of one candle at the distance of twelve feet. Consequently the light of the sun is more than 800,000 times greater than that of the moon.

COMPARATIVE LIGHT OF THE SUN AND THE FIXED STARS.

Dr. Wollaston has inferred, from observations made by him, that the direct light of the sun is about one million times more intense than that of the full moon; and therefore very many million times greater than that of all the fixed stars taken collectively. In order to compare the light of the sun with that of a star, he took, as an intermediate object of comparison, the light of a candle reflected from a small bulb about a quarter of an inch in diameter, filled with quicksilver, and seen by one eye through a lens of two inches focus; at the same time that the star of the sun's image, placed at a proper distance, was viewed by the other eye through a telescope. The mean of various trials seemed to show that the light of Sirius is equal to that of the sun seen in a glass bulb one-tenth of an inch in diameter, at the distance of 210 feet; or that they are in the proportion of one to ten thousand millions; but, as nearly one half of the light is lost by reflection, the real proportion between the light from Sirius and the sun is not greater than that of one to twenty thousand millions.

LIGHT OF THE MOON.

As the moon's axis is nearly perpendicular to the plane of the ecliptic, she can scarcely have any change of seasons. But, what is still more remarkable, one half of the moon has no darkness at all, while the other half has two weeks of light and two of darkness alternately; the inhabitants, if any, of the first half bask constantly in earthshine without seeing the sun, whilst those of the latter never see the earth at all. For the earth reflects the light of the sun to the moon, in the same manner as the moon does to the earth; therefore at the time of conjunction or new moon, her further side must be enlightened by the sun, and the nearer half by the earth; and at the time of opposition or full moon, one half of her will be enlightened by the sun, but the other half will be in total darkness. To the lunarians the earth seems

the largest orb in the universe; for it appears to them more than three times the size of the sun, and thirteen times greater than the moon does to us,—exhibiting similar phases to herself, but in a reverse order; for when the moon is full, the earth is invisible to them; and when the moon is new, they will see the earth full. The face of the moon appears to us permanent, but to them the earth presents very different appearances: the Pacific and Atlantic Oceans, in the course of each twenty-four hours, will successively rivet their attention; and the velocity of motion must excite both surprise and conjecture. Though, as aforesaid, certain of those gentlemen only behold the earth for half a month at a time, those near the border see it only occasionally, and those on the side opposite the earth never see it all. The moon being but the fiftieth part of the bulk of our globe, and within 238,000 miles of us, may be brought by a proper telescope, which magnifies 1000 times, to appear as she would to the naked eye were she only 250 miles off.

COLOR-BLINDNESS.

The name of color-blindness has been given to an affection of the eye, which renders it insensible to certain colors, whether they arise from the decomposition of the solar rays, or from artificial pigments, or from the action of natural bodies upon light. Though isolated cases of this peculiarity of vision were noted as far back as 1684, it is only within a few years that it had been made a subject of much study. Dr. George Wilson of Edinburgh has devoted the most time to it, and in 1855 published a small volume upon the subject. Some of the results he gives are very curious. It appears from the calculations of various examiners that one person out of every fifteen is color-blind. In 1154 persons whom he personally examined, Dr. Wilson found the proportion to be one in eighteen. 1 in 55 confound red with green; 1 in 60 brown with green, 1 in 46 blue with green. It is now placed beyond a doubt that color-blindness is hereditary and runs in families, and as far as experiments have been made the imperfection is far more common in males than in females. All classes appear to be pretty equally subject to this curious infirmity; of a hundred gentlemen sitting together in the House of Lords, or of a hundred members of a mechanic's benefit society, sitting together at their inn, it is equally likely that two are color-blind enough to match a red coat with green trowsers, under the belief that they are purchasing a suit of sober black or drab, and that three more if they were asked to match a few delicate shades of worsted for their wives or sisters, would startle them by their odd

notions of a match. In every large congregation it is almost certain that there are a few men liable to make the mistake into which a color-blind nobleman once fell, who, meeting a lady of his familiar acquaintance dressed in a green silk, asked, with much concern, for whom she was in mourning. In the same assembly there would probably be dozens who would be much puzzled to see the difference between pink and pale blue, these being colors confounded frequently by persons otherwise not subject to confusion.

In the more marked cases of color-blindness, sometimes the majority of colors are distinctly appreciated; but there are at least two, as red and green, or generally four, as red, green, olive, and brown, that are not distinguished from each other. Of the three primary colors, yellow is the one which least frequently escapes perception. Most color-blind persons see it perfectly. A pure blue, well illuminated, is in the next degree least likely to pass unperceived; some color-blind persons pronounce it to be the color of which they have the most vivid perception. On the other hand, combine yellow and blue into green, and you have the greatest of all stumbling-blocks. Green is, by the color-blind, mistaken commonly for red, often, though not so commonly, for blue, and now and then for yellow. Of the three primary colors red is the distracting one. The color-blind identify it very frequently with green, sometimes with perfect black. The red in purple not being perceived, that color counts with them as blue. The red in orange being undetected, that color counts with them as yellow. Red and green, then, are the two colors which the color-blind are least able to appreciate. It is one of the most ordinary cases in connection with color-blindness, that A or B, seeing a scarlet verbena in full blossom, can detect, at a little distance, no difference in color between leaves and flowers, or can perceive no contrast of color in ripe cherries and the foliage of the cherry-tree. Yet it so happens that the red and green are the two colors commonly employed in railway and ship signalling! Of course there is no folly or ignorance imputable to any body in the matter. The colors contrast vividly to ordinary eyes, and when the signals were established little was known of color-blindness, nothing of the extraordinary frequency of its occurrence. It simply happens to be an odd coincidence, that, considering the matter from this point of view, precisely the wrong colors have been chosen.

Dr. Wilson distinguishes three kinds of color-blindness: 1. Inability to see any color but black and white, or light and shadow,—a highly colored picture appearing like a mezzotinto engraving. 2.

Inability to distinguish browns, grays, and neutral colors. 3. Inability to distinguish between red, blue, and yellow, and green, purple, orange and brown. The first of these varieties is very rare. In the second variety the mere shades of the more compound colors, such as browns, grays and the neutral tints, are alone mistaken. Dr. Wilson is of opinion that, in the majority of males, this is the rule more than the exception, though the power of discrimination is perhaps more dormant than absent.

Among his general conclusions Dr. Wilson states that the primary colors, red, blue, and yellow, are never when full confounded with one another, but shades of them are liable to be so. The primary colors are not always confounded with their complementary ones. Color-blindness is a much less serious defect in artificial than in daylight, which probably arises from the predominance of red in all artificial lights. No satisfactory explanation of all the phenomena of color-blindness seems to have been yet propounded.

THE PRINCIPLES OF HARMONY AND CONTRASTS OF COLORS.

A work with the above title has recently been published by M. Chevreul, Superintendent of the dyeing department of the Imperial (Gobelins) Manufactory of France, the object of which is to prove and explain the influence of simultaneous contrasts of colors. M. Chevreul starts with the following axiom, or rather dogma, viz.: "That every color, when placed beside another color, is changed, appearing different from that it really is, and, moreover, equally modifies the color with which it is in proximity." In accordance with the above proposition, M. Chevreul deduces the following rules for the arrangement of colors in dress, for the selection of flowers for bouquets and the decoration of furniture, all founded upon strict philosophical laws.

"*Red Drapery.*—Rose-red cannot be put in contact with the rosiest complexions, without causing them to lose some of their freshness. Dark-red is less objectionable for certain complexions than rose-red, because, being higher than the latter, it tends to impart whiteness to them, in consequence of contrast of tone.

"*Green Drapery.*—A delicate green is, on the contrary, favorable to all fair complexions which are deficient in rose, and which may have more imparted to them without inconvenience. But it is not as favorable to complexions that are more red than rosy, nor to those that have a tint of orange mixed with brown, because the red they add to this tint will be of a brick-red hue. In the latter case a dark-green will be less objectionable than a delicate green.

"*Yellow Drapery.*—Yellow imparts violet to a fair skin, and in this view it is less favorable than a delicate green. To those skins which are more yellow than orange, it imparts white; but this combination is very dull and heavy for a fair complexion. When the skin is tinted more with orange than yellow, we can make it roseate by neutralizing the yellow. It produces this effect upon the black-haired type, and it is thus that it suits brunettes.

"*Violet Draperies.*—Violet, the complementary of yellow, produces contrary effect; thus, it imparts some greenish-yellow to fair complexions. It augments the yellow tint of yellow or orange skins. The little blue there may be in a complexion it makes green. Violet, then, is one of the least favorable colors to the skin, at least when it is not sufficiently deep to whiten it by contrast of tone.

"*Blue Drapery.*—Blue imparts orange, which is susceptible of allying itself favorably to white and the light flesh tints of fair complexions which have already a more or less determined tint of this color. Blue is, then, suitable to most blondes, and in this case justifies its reputation. It will not suit brunettes, since they have already too much of orange.

"*Orange Drapery.*—Orange is too brilliant to be elegant; it makes fair complexions blue, whitens those which have an orange tint, and gives a green hue to those of a yellow tint.

"*White Drapery.*—Drapery of a lustrous white, such as cambric muslin, assorts well, with a fresh complexion, of which it relieves the rose color; but it is unsuitable to complexions which have a disagreeable tint, because white always exalts all colors by raising their tone; consequently it is unsuitable to those skins which, without having this disagreeable tint, very nearly approach it. Very light white draperies, such as muslins, plaited or pointed lace, have an entirely different aspect.

"*Black Drapery.*—Black draperies, lowering the tone of the colors with which they are in juxtaposition, whiten the skin; but if the vermilion or rosy parts are to a certain point distant from the drapery, it will follow that, although lowered in tone, they appear, relatively to the white parts of the skin contiguous to the same drapery, redder than if the contiguity to the black did not exist."

The delicate perception of beauty that the young may be trained to from the education of the sense of sight, may be gathered from the following laws of discord in the grouping of flowers: We must separate pink flowers from those that are either scarlet or crimson, orange flowers from orange yellow, yellow from greenish yellow,

blue from violet blue, red from orange, pink from violet, blue from violet.

The subjoined rules of taste in furniture show the pleasure that we lose from the possession of the bound genii, that unintelligible talisman, a dormant sense. Nothing contributes so much to enhance the beauty of a stuff intended for chairs, sofas, &c., as the selection of the wood to which it is attached; and, reciprocally, nothing contributes so much to increase the beauty of the wood as the color of the stuff in juxtaposition with it. After what has been said, it is evident that we must assort violet or blue stuffs with yellow woods, such as citron, the roots of the ash, maple, satin wood, &c.; green stuffs with rose or red-colored woods, as mahogany. Violet or blue-grays, are equally good with yellow woods, as green-grays are with the red woods. But in all these assortments, to obtain the best possible effect, it is necessary to take into consideration the contrast resulting from height of tone; for a dark-blue or violet stuff will not accord so well with a yellow wood as a light tone of the same colors; and it is for this reason that yellow does not assort so well with mahogany as with a wood of the same color, but not so deep. Among the harmonies of contrast of tone that we can make with wood which we leave of the color which is peculiar to it, as ebony, its brown color permits its employment with light stuffs to produce contrasts of tone rather than contrasts of color. We can also employ it with very brilliant, intense colors; such as poppy-scarlet, flame-color, &c.

The following subtleties may be useful to men in trade:

When a purchaser has for a considerable time looked at a yellow fabric, and he is then shown orange or scarlet stuffs, it is found that he takes them to be amaranth-red, or crimson, for there is a tendency in the retina, excited by yellow, to acquire an aptitude to see violet, whence all the yellow of the scarlet or orange stuff disappears, and the eye sees red, or a red tinged with scarlet. Again, if there are presented to a buyer, one after another, fourteen pieces of red stuff, he will consider the last six or seven less beautiful than those first seen, although the pieces be identically the same. What is the cause of this error of judgment? It is, that the eyes, having seen seven or eight red pieces in succession, are in the same condition as if they had regarded fixedly during the same period of time a single piece of red stuff; they have then a tendency to see the complementary of red: that is to say, green. This tendency goes of necessity to enfeeble the brilliancy of the red of the pieces seen later. In order that the merchant may not be the sufferer by this fatigue of the eyes of his cus-

tomers, he must take care, after having shown the latter seven pieces of red, to present to him some pieces of green stuff, to restore the eyes to their normal state. If the sight of the green be sufficiently prolonged to exceed the normal state, the eyes will acquire a tendency to see red; then the last seven red pieces will appear more beautiful than the others. The optical effect of dark and black dresses is to make the figure appear smaller, hence it is a suitable color for stout persons; black shoes diminish the apparent size of the feet. On the contrary, white and light-colored dresses make persons appear larger. Large patterns make the figure look shorter; longitudinal stripes, if not too wide, add to the height of the figure; horizontal stripes have a contrary effect, and are very ungraceful. It is always necessary that, if one part of the dress be highly ornamented or consist of various colors, a portion should be plain, to give repose to the eye. The French manufacturers pay great attention to this subject, and the good effects of this study are visible in their textile fabrics.—*London Art Journal.*

COLORS OF THE OCEAN.

The usual tint of the Mediterranean Sea, when undisturbed by accidental or local causes, is a bright and deep blue; but in the Adriatic a green tinge is prevalent; in the Levant basin it borders on purple; while the Euxine often has the dark aspect from which it derives its modern appellation. The clear ultramarine tint is the most general, and has been immemorially noticed; although the diaphanous translucence of the water almost justifies those who assert that it has no color at all. Seamen admit of one conclusion in regard to color—namely, that a green hue is a general indication of soundings, and indigo blue of profound depth.—REAR-ADMIRAL SMYTH, *on the Mediterranean.*

COLORS MOST FREQUENTLY HIT IN BATTLE.

It would appear, from numerous observations, that soldiers are hit during battle according to the color of their dress in the following order:—Red is the most fatal color; the least fatal, Austrian gray. The proportions are red 12, Rifle Green 7, Brown 6, Austrian bluish-gray 5.

DISTANCES OF FIRES.

A conflagration at night appears to spectators, generally, as if much nearer than it really is · and unthinking persons frequently run to-

wards it with the expectation of reaching the spot every instant, and are thus led considerable distances. The cause of this miscalculation of distance is the intense brightness of the fire in contrast with the darkness of the night.

HOW TO VIEW PICTURES.

Although the relief of solid objects (and distances as its representative) is best seen with two eyes, yet it is equally true that vision with one eye is superior to two for some purposes. In looking at an oil painting, the surface of which is covered with varnish, the figures and objects represented appear more distinctly when examined with one eye only. The varnish reflects the light which falls upon it to each eye—when both are open—and from objects in various parts of the room, therefore, by closing one eye, a quantity of the reflected light is shut out, and the mind then contemplates the picture with less disturbance. All painters (artists) are well aware of this fact, hence they generally examine oil paintings under a bright light by monocular vision. The pictures in a room or gallery having side-lights, should always be viewed with one eye closed, the open one being that which is best shaded from the light. The light which falls in greatest quantity on any one eye, diminishes its sensibility to the red rays, and gives a false coloring to the pictures.

A photographic picture is seen more perfectly with one than with two eyes; it being a plane surface, the one eye is not so much troubled in adjusting the pupil while examining the different points; and, besides, as it cannot appreciate distance so well as two eyes, the light and shadow, although on a plane surface, actually appear as if the objects represented were in relief.

There are three kinds of relief when we look at a picture on a plane surface, such as a daguerreotype, viz., ocular, with two eyes, monocular, with one, and binocular, when two pictures of the same figure are combined, as in the stereoscope. If we look at any one of two stereoscope pictures with two eyes it has very little relief; if we look at it with one eye, either in or out of the stereoscope, the relief is greater than with two eyes; but when we look at the two pictures combined in the stereoscope, the relief is perfect, giving an accurate representation of the original, if the two pictures have been taken at the proper angle for two eyes, at about three inches apart.—*North British Review, Nov.* 1856.

POWER OF THE EYE IN VIEWING MINUTE OBJECTS.

The smallest particle of a white substance distinguishable by the naked eye upon a black ground, or of a black substance upon a white ground, is about the 1-400th of an inch square. It is possible, by the closest attention, and by the most favorable direction of light, to recognize particles that are only 1-540th of an inch square; but without sharpness or certainty. But particles which strongly reflect light may be distinctly seen, when not half the size of the least of the foregoing; thus, gold dust of the fineness of 1-1125th of an inch may be discerned with the naked eye in common daylight. When particles that cannot be distinguished by themselves with the naked eye, are placed in a row, they become visible; and hence the delicacy of vision is greater for lines than for single particles. Thus, opaque threads of no more than 1-4900th of an inch across, or about half the diameter of the silkworm's fibre, may be discerned with the naked eye, when they are held towards the light.—CARPENTER's *Animal Physiology*.

PHENOMENA OF VISION.

It has been ascertained beyond doubt, that in perceiving the tint of the scarlet geranium our eyes are affected by undulations, recurring 482 millions of times in a second; that before we can appreciate the tint of the yellow blossoms of the gorse or laburnum, 542 millions of millions of vibrations must have taken place; and that to discriminate the color of the violet, not less than 707 millions of millions of movements must have been communicated to the fibrilia of our retina!

MOTION OF THE EYE.

On coming into a room, we think we see the whole side of it at once—the pictures, the cornice, the chairs,—but we are deceived: being unconscious of the Motions of the Eye, and that each object is rapidly, but successively, presented to it. It is easy to show that if the eye were steady, vision would be quickly lost; that all those objects which are distinct and brilliant, are so from the motion of the eye; that they would disappear if it were otherwise. For example, let us fix the eye on one point—a thing difficult to do, owing to the very disposition to motion in the eye. When we have done so, we shall find that the whole scene becomes more and more obscure, and finally vanishes. If we then change the direction of the eye but ever so little, at once the whole scene will be again perfect before us. These phenomena are consequent upon the retina being subject to ex-

haustion, by the lights, shades, and colors of objects continuing to strike upon the same relative parts, and thus exhausting the nerve; but when the eye shifts, there is a new exercise of the nerve.

THE WATER TELESCOPE,

For seeing under water, consists of a tube to enable a person looking over the gunwale of a boat to rest the head on one end, while the other is below the surface of the water; the upper end being so formed that the head may rest on it, both eyes seeing freely into the tube. Into the lower end is fixed (water-tight) a plate of glass, which, when used, is to be kept under the surface of the water; so that the spectator, looking down the tube, sees all objects at the bottom whose reflective powers are able to send off rays of sufficient intensity to be impressed on the retina, after suffering the loss of light caused by the absorbing power of the water.* In clear water the bottom may thus be seen at the depth of twelve fathoms. This contrivance is much used in seal-shooting along the northern and western islands of Great Britain, where, sometimes in the form of an ordinary washing-tub with a piece of glass fixed in its bottom, the shot seal is looked for, and the grappling-hook let down to bring him to the surface. The Norwegian fishermen also often use this telescope when their anchors get into foul ground, or their cables warped on a roadstead.

DISSOLVING VIEWS.

This beautiful optical combination is made by means of two magic lanterns; in one of which is the summer representation, and in the other the winter representation of the same landscape, when the one is made to pass into the other with a beauty and effect which it is impossible to describe. The same effect might be produced, though less perfectly, by mirrors; so that the ancients might have effected any metamorphosis they chose by such an apparatus; they might have thus summoned the dead man from his grave, or given to the pallid corpse both life and motion.

SPECTACLES.

Spectacles should be made of glass of the lowest dispersive power, or, what is better, of rich crystal (Brazilian quartz called pebbles)

* Light in passing through pure sea-water, loses half its intensity for each 15 feet through which it passes.—Sir JOHN LESLIE.

which has a lower dispersive power than any kind of glass and therefore gives refraction with less color. The lenses should be as thin as possible, and have no more thickness at their edges than is necessary to keep them firm in their frames. The form of the lenses should be double convex, and the radii of the outer and inner surfaces as 6 to 1 in glass and as 14 to 1 in rich crystal, in order to produce the least spherical aberration, and consequently the most perfect image on the retina. As the eyes are placed at different distances in different persons it is a matter of essential importance to have the lenses at such a distance from each other that their centres shall be in lines drawn from a point at the distance at which we wish to read, or draw, or work with them, to the centre of the pupils. In order to determine this, ascertain at what distance from the eye the lens will be placed when it rests in its proper position in its frame on the nose, and also the distance between the eyes, that is, the centres of the pupils when they are directed to a point at the distance at which we wish to use them. These three distances will obviously give the distance of the centres of the lenses from each other, which must always be less than the distances between the centres of the pupils. Very little attention is paid by opticians to this most essential point in the construction of spectacles, but it is obvious that, if the distances between the centres of the pupils and the centres of the lenses, be exactly the same, each eye looks through the part of the lens on the inner side of the centres of the lens, so that prismatic or colored vision is the necessary consequence.

Another important point is to determine the focal length, or power, or number, as it is called by opticians, of the glasses to be used. This is usually done by trying various numbers. But this is at best an uncertain mode, for it is by no means an uncommon thing that the focal length of a person's two eyes is different. It is therefore important to ascertain whether this inequality exists, and then to ascertain the focal length of the lenses required to equalize them. For this purpose an instrument called a *visometer* has been recently introduced.

Although spectacles may be required for reading, or for every kind of work executed by the hands, they may not be needed for greater distances. In general, however, when spectacles have been used for ten or twelve years, and in advanced life, they may be required for examining pictures in a gallery, or public buildings, or even landscapes, whether within a short distance of us or more remote. In these cases one or two additional pairs of spectacles are required, and in all these the centres of the glasses must be more distant than those in the

spectacles used for reading, but always less than the distance between the centres of the pupils. The spectacles for a picture gallery, or for viewing pictures in private houses, must have their lenses of a much greater focal length than those used for reading, and the same lenses should be used in looking through the stereoscope. In old age, a third pair of spectacles for viewing very distant objects, and having very long focal lengths, will be found particularly useful.

As almost every person with normal sight, that is, every person who is not short-sighted, must, with very few exceptions, require the use of spectacles, it is of importance to determine the time when they should first use them. It is a common practice with those who are unwilling to be considered old, to delay the use of glasses as long as possible. This is a great mistake and one most injurious to the eyes. Spectacles should not only be used the moment they enable us to read or to work more easily, but as the eyes become more long-sighted, with age, new and deeper glasses should be substituted. The eye is an organ of too delicate a structure to be rudely used, and cannot with impunity be exposed every day to a constant strain, striving to see what is beyond its power, to pry into what is too minute, or to decipher what is indistinct or confused.

The observations which we have made on spectacles for long-sight, are, generally speaking, applicable to the short-sighted. This species of imperfect vision is commonly congenital, or existing at the birth. The eye, however, often suffers remarkable changes in its focal length during its growth, and persons who were short-sighted in early life recover from it at a greater age, while those who were not short-sighted in infancy become so afterwards.

Eye-glasses are seldom used excepting by those who are ashamed to employ spectacles. To look at any object with one eye when we have two at our disposal, is to injure both—the one by too much work, the other by too little. In the occasional use of an eye-glass the eye cannot be much injured especially if it is applied as often to the one eye as to the other, but no person who values his sight will employ it habitually even with this precaution.

During the last century green glasses have been employed to protect the eye from excessive light, and they are decidedly the best of all colored glasses, as they absorb the extreme violet and blue rays, and transmit the red, thus producing a shorter spectrum, and consequently a more distinct image on the retina. Fashion, however, always the victim of ignorance, has introduced blue glasses, which, as they absorb different parts of the spectrum unequally and transmit

the extreme violet and blue rays, are more mischievous than useful. Science, however, has substituted for green and blue media, an opaque glass of no color, by means of which we can moderate, in any degree we choose, the light which reaches the eyes.—SIR DAVID BREWSTER *in North British Review*, Nov. 1856.

TRANSPARENCY OF THE OCEAN.

Philosophers ashore and philosophers of the forecastle, have wondered in all times as to the cause and extent of the color of the sea, and queried how far into it our vision could penetrate. Capt. Wilkes advanced tho opinion that the transparency of the sea varied quite directly with its temperature. To this my observations do not allow me to assent. In order to obtain correct observations, the surface of the sea must be perfectly tranquil and smooth. There must not be a ripple on it. So essential is this point, that, during a cruise of four years I only succeeded in making sixteen observations that proved worth saving. Of these sixteen, in only one the water was ruffled by a slight breeze. The next trouble was to discover what object would be most likely to reflect all the rays of light, what would be longest visible. First we tried an iron-pot, painted white. Next we tried a sphere of hoops, covered with white cotton cloth. Next we tried a mere hoop, covered with a canvas. At last we took a common white dinner-plate. It was good enough. It was the brightest object we could find, was always handy, and was always clean. It was slung so as to lie in the water horizontally, and sunk by an iron-pot, with a line. The observations were taken wherever we could get them—ranging over 200° of latitude, in different oceans, in very high latitudes, and near the equator. I have to assume, what doubtless I may, that they do not differ from what they would if taken all in the same place. At every station we noticed in the connection, the sun's latitude, the velocity of the current, the temperature of both the air and the water, and the number of fathoms at which the plate was visible below the surface. We took these observations from a boat, bringing the line on to its shady side—then leaning over, with faces almost touching the water, and eyes shaded from the reflected rays from the surface, by the brims of our hats, we watched for the disappearance of the plate as it was slowly let down. The varying points between which it disappeared from the vision of all, and where all could see it, never were farther separated than the length that the line could be lifted or let down by a reach of the arm—not over four feet. The

waters varied thermometrically from 40° to 85°. The results prove that the lowest degree of temperature gave the shortest line of visibility. And at the point where the water was the warmest, there we saw the plate at the greatest depth. On two occasions we saw the plate when it was twenty-five fathoms below the water's surface, and on one of these the water was at 85°. On these occasions, all noticed the extraordinary clearness of the water. To lie in the boat and look down, was like looking down from the mast-head. Objects were as clearly defined to a great depth. On this occasion I tried if a contrast of colors would increase the visibility. I so placed the plate upon the pot that a periphery of the black surface surrounded the white plate, but it made no difference at all. I think the maximum of visibility under water, under the most favorable circumstances, is twenty-five fathoms. But between the highest and lowest points of visibility, which corresponded with the highest and lowest points of the water's temperature, there were great variations, which showed no direct correspondence between the temperature and the line of visibility. At the mouth of the Mississippi we find the water no more transparent than so much muddy water. The farther we get from the point where earthy matters in large quantities are washed in, the clearer the water is. Now the Pacific, like the Atlantic, is a great whirlpool—a tide flowing entirely around its circumference. In latitude 20° on the west side of the Pacific, farthest removed from all stormy quarters, and where the ocean is stillest, we found the greatest transparency of water. Off Cape Horn, where eternal storms drive up the dirt torn by glaciers and icebergs from the regions around the Pole, the water was exceedingly turbid. With the thermometer at 68°, we got only ten fathoms of visibility.—Capt. Glynn, *to American Association.*

THE ATLANTIC WAVES.

Dr. Scoresby made some interesting observations on the Atlantic waves—their magnitude, velocity, and phenomena, during two passages across the Atlantic in 1847–48. The most interesting ones were on the return voyage, in March, 1848, in the Hibernia, on account of the high seas, and the peculiar construction of the upper works of the ship, which afforded various platforms of determinate elevation above the line of flotation. The first observation was on March 5, the wind being about W. S. W., and the ship's course, true N. 52° E. The wind had blown a hard gale the previous night, and still continued. Dr. S. took his station on the cuddy roof, the eye being 23 feet 3 inches above the line of flotation of the ship, and found that almost every

wave rose so much above the level of the eye as to yield only the "minimum" elevation, showing that they were most of them more than 24 feet high (including depression as well as altitude); or, reckoning from the mean level of the sea, more than 12 feet. He then went to the larboard paddle-box, where the eye was 30 feet 3 inches above the sea, a level which was very satisfactorily maintained during the instants of observation, because of the whole of the ship's length being occupied within the clear "trough of the sea," and in an even and upright position, whilst the nearest approaching wave had its maximum altitude. Here, too, at least half the waves were far above the level of the eye, long ranges extending perhaps 100 yards on one or both sides of the ship (the sea coming nearly right aft), rising so high along the visible horizon, as to form an angle estimated at 2° to 3°, when the distance of the wave summit was about 100 yards. This would add nearly 13 feet to the level of the eye. This amount of elevation was by no means uncommon, and sometimes peaks of crossing, or crests of breaking seas, would shoot upwards at least 10 or 15 feet higher. The average wave was fully 15 feet or upwards, and the mean highest waves, not including the broken crests, about 43 feet above the level of the hollow occupied at that moment by the ship. The next day, after a storm of about 36 hours, which had abated several hours before the observation, so that the waves had perceptibly subsided, waves were noticed of 26 feet average elevation from ridge to hollow, and even of 30 feet; they were, however, of no great extent on the ridge. At this time another subject of investigation was the period of the regular wave overtaking the ship, and the determination, proximately, of their actual width or intervals, and their velocity. The period of regular waves, in incidental series, overtaking the ship was, on the average, 16.5″. A wave passed the length of the ship, 220 feet, in about 6 seconds, and an estimate gives 559 feet as the probable mean distance of the waves, or the width passed over between crest and crest. To this, however, an addition must be made, on account of the progression of the ship in the same direction, of 231.5 feet, giving 790.5 feet for the actual distance traversed by the wave in 16.5 seconds of time, being at the rate of 32.67 English statute miles per hour. Of the elements employed in this calculation, all but one may be deemed accurate, the doubtful one being the average distance from summit to summit of the waves: and even this must be very nearly correct. As to the form of the waves, it was found that it was less regular during the height of the gale, than after the wind had begun to subside.

In Sir James Ross's "Voyage to the Southern Seas," occurs the following passage: "Although the south-westerly breeze of the preceding day hardly amounted to a moderate gale, we found that this morning we had run into a heavy swell from that direction. The result of several experiments gave only 22 feet for the entire height of the waves, or 11 feet above and below the general level of the ocean; the velocity of the undulations 89 miles per hour, and the interval between each were 1910 feet."

Mr. J. Stevenson, who has made many observations upon waves on coasts, states, that so far as his observations have gone, waves seem to increase in height most nearly in the ratio of the square root of their distances from the windward shore.

INFLUENCE OF OIL ON WATER.

Prof. Horsford, of Cambridge, states that having frequently noticed that there were spaces of some extent, in places where the waves broke, which were very smooth; that though the swell, or rise and fall, of the water was just as great, yet there was no breaking of the waves, no white crest or comb; that he had been led to believe that these smooth spots were occasioned by oil or oleaginous matter, which had accidentally happened to be spread on the surface at such places. To test this, he had himself, when there was quite a stiff breeze, with waves on the surface of the water, which broke with considerable of a comb or crest, emptied a vial of oil on the water from a boat. The effect was instantly seen. As far as the oil spread the water was smooth, and the waves did not break; and, what was very curious, the oil spread over the surface almost as rapidly to the windward as it did to the leeward. Commodore Wilkes in confirmation of this statement cites an instance where he saw the same effects in a violent storm off the Cape of Good Hope, from the leakage of a whale-vessel, and states that it was very curious to observe over what a great extent a small quantity of oil would produce the effect spoken of. Almost every one knows the anecdote of Franklin stilling the sea, to the astonishment of the uninitiated, by stretching his cane over the side of the ship, the cane having a small vial of oil in the end of it. The philosophy of the phenomenon is that, when oil is placed on water, the oil has more cohesion for the water than for itself, while with water it is different; it has greater adherence to itself than to the oil. If you attempt to separate the two by a disc placed on the surface of water which oil has covered, the break is not between the oil and water, but between oil and oil.

A contrary opinion as to the fact seems to have been arrived at by a Commission of the Royal Institute of the Pays Bas, in 1844, which experimented upon a portion of the North Sea; when several gallons of oil were poured upon the restless waves without the effect of diminishing their motion; indeed, the phrase was stated by the Commission to be only a poetical embellishment.

POWER AND VELOCITY OF WAVES.

The dynamic force exerted by waves is greatest at the crest of the wave before it breaks, and its power in raising itself is measured by various facts. At Wasberg, in Norway, in 1820, it rose 400 feet, and on the coast of Cornwall, in 1843, 300 feet. There are, likewise, cases, showing that waves have sometimes raised a column of water equivalent to a pressure of from three to five tons to the square foot. It has also been proved that the velocity of waves depends on their length; that waves of from 300 to 500 feet in length, from crest to crest, travel with a velocity of from 20 to 27½ miles an hour; and this whether they are 5 or 54 feet in total height. Waves travel very great distances, and are often raised by far-off hurricanes, having been felt simultaneously at St. Helena and Ascension, though 600 miles apart; and it is probable that ground swells often originate at the Cape of Good Hope, 3000 miles distant. Nor do waves exert their force at or near the surface only, one instance being mentioned where a diving-bell at the depth of 8 fathoms, was moved 5 feet laterally, in calm weather. The motion of "shingle" depends on the direction in which the surf strikes the shore, which is influenced by the direction of the wind; and this is shown, from observations on the French coast, to be in the ratio of 229 days from western quarters, to 132 days from eastern quarters.—A. G. FINDLAY, *on Artificial Breakwaters.*

At the meeting of the British Association in 1850, Mr. Stevenson stated, as the result of experiments made by an accurate self-registering instrument, that the force of the waves may be stated to be a force of about 1½ tons per square foot for the German Ocean, and of 3 tons for the Atlantic Ocean. The experiments were made at Bell Rock and Skerryvore lighthouses.

MISCONCEPTIONS OF THE NATURE AND APPLICATION OF MECHANICAL POWER.

One of the most fruitful sources of error and deception with regard to inventions, arises from misconceptions of the nature and ap-

plication of mechanical power; and this is one of the points on which I wish to arrest your attention for a few minutes. We understand by the term mechanical power that which moves machinery, transports heavy bodies, shapes the raw material into useful forms, and, to use the short but expressive phrase of the mechanic, "*that which does work.*" Mechanical power, when properly understood, is a condition or state of matter. Thus, a quantity of burning fuel, a moving mass of water or of air, are bodies in the condition of power, and, by communicating a portion of their motion to other bodies, they produce in them certain changes which are denominated *work*. The change thus produced is the measure of the amount of power in a given quantity of matter. For example, the number of bushels of grain which can be ground during the combustion of a bushel of coal is the measure of the amount of power in this quantity of fuel.

Power is always expended in doing work, and it is in the highest degree absurd to think of applying it to useful purposes without exhausting it. Every change of condition, every transformation of matter, every new motion, and every manifestation of life, is at the expense of some motive power which, having performed its part, is for ever neutralized.

Power is always the product of Nature. God has not vouchsafed to man the means of its primary creation. He finds it in the moving air and the rapid cataract; in the burning coal, the heaving tide. He transfers it from these to other bodies, and renders it the obedient slave of his will—the patient drudge which, in a thousand ways, administers to his wants, his convenience, and his luxuries, and enables him to reserve his own energy for the higher purpose of the development of his mind and the expression of his thoughts.

The following is a list of all the primary powers which as yet have been used by man in accomplishing his varied purposes in the wide domain of practical life. These are:

1. Water power.
2. Wind power.
3. Tide power.
4. The power of combustion; and
5. The power of vital action.

To this list may hereafter be added the power of the volcano and the internal heat of the earth; and, besides these, science at the present time gives no indications of any other. These are denominated primary powers, though, in reality, when critically studied, they may

all, except the two last mentioned, be referred to actions from without the earth, and principally to emanations from the sun.

Gravitation, electricity, galvanism, magnetism, and chemical affinity can never be employed as original sources of power. At the surface of the earth, they are forces of quiescence, the normal condition of which must be disturbed before they can manifest power; and then the work which they are capable of performing is only the equivalent of the power which was communicated to them.

There is no more prevalent and mischievous error than the idea that there is, in what are called the imponderables, a principle of spontaneous activity. Heat is the product of chemical action; and electricity only manifests power when its equillibrium is disturbed by an extraneous force, and then the effect is only proportional to the disturbing cause. It was for this reason that the existence of electricity remained so long unknown to man. Though electricity is not in itself a source of power, yet, from its extreme mobility and high elasticity, it affords the means of transmitting power with scarcely any loss, and almost inconceivable velocity, to the greatest distance. A wave of disturbance, starting from the impulse given at the battery, will traverse the circumference of the earth in less time than I have been occupied in stating the fact.

Besides electricity and the principles before mentioned, there are other agents employed between the primary power and the *work*—namely, the elastic force of steam, of air, and of springs; also, various instruments called machines. But these must not be confounded, as they frequently are, with the sources of power. It is not the engine which is the source of motion of the cars, nor yet the steam, but the repulsive energy imparted to the expanding water from the burning fuel.

A machine is an intermediate instrument to transmit, to modify, and to apply power; and, with the exception of the power consumed in wearing away the rubbing parts—that is, in producing friction—and the small portion imparted to the air, the amount of power transmitted is just equal to that received.

The human body is itself an admirably contrived complex machine, furnished with levers, pulleys, cords, valves, and other appliances for the application and modification of the power derived from the food. It is, in fact, a locomotive engine, impelled by the same power which, under another form, gives activity and energy to the iron horse of the railway. In both the power is derived from combustion of the carbon and hydrogen of the organic matter employed for

food or fuel. In both the direction of power is under the influence of an immaterial, thinking, willing principle, called the soul. But this must not be confounded, as it frequently is, with the motive power. The soul of a man no more moves his body than the soul of the engineer moves the locomotive and its attendant train of cars. In both cases the soul is the directing, controlling principle, not the impelling power. Let, for example, a locomotive engine be placed upon the track, with water in the boiler and fire in the grate, in short, with all the potentials of motion, and it will still remain quiescent. In this state, let the engineer enter the tender and touch the valve; the machine instantly becomes instinct with life and volition; it has now a soul to govern its power and direct its operations; and, indeed, as a whole, it may be considered as an enormous animal, of which the wheels and other parts are additions to the body of the engineer.

The facts I have given as to the source of power and its application rest upon the widest and best-established inductions of physical science; and a knowledge of them is absolutely essential to every one who desires to improve the art of applying the powers of the elements to useful purposes. And yet, if we are to judge from the constant announcement in the papers of new motors, of machines moved by centrifugal force, of engines to do a large amount of work with the expenditure of an infinitesimal quantity of power, of contrivances by which electricity is to develop itself and do work by its own force, we shall be convinced that, on projects which are in opposition to the best established truths of science, hundreds of thousands of dollars are squandered, and years of thought and labor wasted. One cause of error of this kind is the unfortunate name which was originally given to, and is still retained by, certain elementary machines—viz., the lever, the wheel and axis, the inclined plane, the pulley, and the screw. These are employed, separately, as instruments for the application of power, or in combination, as the elementary parts of complex machines. Every tyro in science knows that they have no power in themselves; yet the name, *mechanical powers*, by which they are designated, tends to perpetuate a pernicious error long after the fallacy is understood.—PROF. HENRY. *Address before the Washington Mechanics' Association.*

PLACING OF LARGE STONES BY THE ANCIENTS.

It is usually a matter of wonder to modern observers that the ancients, destitute as they were of complicated machinery, should have been able to transport, raise, and place large stones, whether

standing alone or as part of such buildings as the pyramids. The late discoveries at Nineveh fully expound to us the means of transporting large blocks: it was by placing rollers beneath. As to the means of raising, all we learn from Herodotus is, that it was effected by *short pieces of wood*. How so? The following suggestion in reply was made a few years ago by a gentleman named Perigal, before the British Association: Suppose a block has to be raised up along the pyramid, in order to be placed in one of the courses of the masonry. It is brought by rollers to the base of the building. There all the rollers are removed except one near the centre. One end of the stone being now depressed to the ground, a pile of slips of wood is placed under it, close to the centre, this pile being rather higher than the roller, and terminating in one narrow piece at the top. The stone is now tilted so as to bring the other end to the ground. It is now possible to put a similar pile of pieces of wood underneath, close beside the first. On that pile, the block is tilted back to its former position, and so on till it is raised a little above the level of the next course of masonry. By rollers it is moved on to that platform, with a low pile of blocks once more near the centre underneath. Then the process of tilting and raising is again gone through; and so on till it has been raised up to the level where it is to take its place in the masonry. By this simple process, too, says Mr. Perigal, a few men might have raised Stonehenge in a single night, if the requisite stones were prepared and placed in readiness near the spot.

ARCHIMEDES AND THE LEVER.

The apothegm of Archimedes—"Give me a lever long enough and a prop strong enough, and I will move the world"—arose from his knowledge of the possible effects of machinery; and, however it might astonish a Greek of his day, would now be readily admitted to be as theoretically possible as it is practically impossible; for, in the words of Dr. Arnott, Archimedes "would have required to move with the velocity of a cannon-ball for millions of years to alter the position of the earth by a small part of an inch. This feat of Archimedes is, in mathematical truth, performed by every man who leaps from the ground, for he kicks the world away from him whenever he rises, and attracts it again when he falls."

HORSE POWER.

This is a unit of force introduced by Watt to enable him to determine what size of engine to send to his customers to supersede the

number of horses which the new power was to replace. Watt ascertained that the average force exerted by the strongest horse in one of the London breweries was sufficient to raise 33,000 lbs. one foot high in a minute, thus, an engine of 200 horse power would be a force equal to that of 200 horses, each lifting 33,000 lbs. one foot high per minute. In modern practice, however, owing to various modifications and allowances made for friction and other things, the term horse power has ceased to have so definite a meaning. It is made now to refer rather to the size of the cylinder than to the power exerted, and the value of the unit has been so varied that a horse power may imply 52,000 lbs. or 60,000 lbs. or 66,000 lbs. raised one foot high per minute.

MECHANISM OF THE BONES.

In the human skeleton there are commonly enumerated 260 bones, which present every variety of size and figure. But all these varieties may be reduced to three classes: the long and round, as the bones of the upper extremities; the broad and flat, as the bones of the skull; or the short and square, as the separate bones that compose the vertebral column. The long bones are adapted for motion, the flat for protection, and the square for motion combined with strength. Accordingly, the long bones are moulded into lengthened cylinders, and form so many levers, exquisitely constructed and combined. In the employment of the flat bones for the covering of some of the more tender and delicate organs, as the brain and spinal cord, the form of these bones adds to their strength, as in the vaulted roof of the skull; while in the construction of the vertebral column, composed of the short and square bones, which are so adjusted, as to afford a limited range of motion with a great degree of strength, so many and such opposite purposes are effected by means so simple yet so efficient, that no fabric constructed by human ingenuity approaches the perfection of this admirable piece of mechanism.

ART OF WALKING.

In a graceful human step, the heel is always raised before the foot is lifted from the ground, as if the foot were part of a wheel rolling forward; and the weight of the body supported by the muscles of the calf of the leg, rests for the time on the fore part of the foot and toes. There is then a bending of the foot in a certain degree. But where strong wooden shoes are used, or any shoe so stiff that it will not yield and allow this bending of the foot, the heel is not raised at all until

the whole foot rises with it; so that the muscles of the calf are scarcely used, and, in consequence soon dwindle in size, and almost disappear. For the same reason in Paris where the streets have (few or) no side-pavements, and the ladies have to walk almost constantly on tiptoe, the great action of the muscles of the calf has given a conformation of the leg and foot, to match which the Parisian belles proudly challenge all the world—not aware, probably, that it is a defect in their city to which the peculiarity of their form is in part owing.—BELLS, *Bridgewater Treatise.*

THE STRIDE OF A RACE-HORSE.

Herring, the celebrated animal-painter, states that a Race-horse will clear from 20 to 24 feet at a bound; and from the impression left on the turf he infers that a horse at full gallop places only one foot at a time upon the ground. This, he says, is more convincing to the ear than to the eye. In listening to a horse galloping on a hard road, it will be found accurately exhibited by placing the little finger on a table or a pane of glass, and causing the other three fingers to follow in rotation; by so doing, the precise sound of that of a horse galloping will be produced. Then follows the bound, and again the 1, 2, 3, 4, in regular succession; or, as Virgil gives it in his imitative line (*Æn.* viii. 596):

"Quadrupedante putrem sonitu quatit ungula campum."

DIFFERENCE BETWEEN A WATCH AND A CLOCK.

A Watch differs from a Clock in its having a vibrating wheel instead of a vibrating pendulum; and, as in a clock, gravity is always pulling the pendulum down to the bottom of its arc, which is its natural place of rest, but does not fix it there, because the momentum acquired during its fall from one side carries it up to an equal height on the other—so in a watch a spring, generally spiral, surrounding the axis of the balance-wheel, is always pulling this towards a middle position of rest, but does not fix it there, because the momentum acquired during its approach to the middle position from either side carries it just as far past on the other side, and the spring has to begin its work again. The balance-wheel at each vibration allows one tooth of the adjoining wheel to pass, as the pendulum does in a clock; and the record of the beats is preserved by the wheel which follows. A main spring is used to keep up the motion of the watch, instead of the weight used in a clock; and as a spring acts equally well whatever be

its position, a watch keeps time although carried in the pocket, or in a moving ship. In winding up a watch, one turn of the axle on which the key is fixed is rendered equivalent, by the train of wheels, to about four hundred turns or beats of the balance-wheel; and thus the exertion, during a few seconds, of the hand which winds up, gives motion for twenty-four or thirty hours.

RAZOR AND HOT WATER.

It was long supposed that the effect of dipping a Razor in Hot Water was to remove from its edge a kind of resinous substance, which was thought to injure its sharpness. Such, however, is not the real effect. The fine edge is given to all blades of steel by tempering them, that is, heating them, and plumping them into cold water. Now, it has been proved by experiment, that the heat of 212° is the exact point at which razor edges are admirably tempered; and, as the heat of boiling water is 212°, by dipping a razor into it, you, as it were, again temper, or give a new edge to the razor.

HOW THE DIAMOND CUTS GLASS.

Dr. Wollaston ascertained that the parts of the Glass to which the Diamond is applied are forced asunder, as by a wedge, to a most minute distance, without being removed; so that a superficial continuous crack is made from one end of the intended cut to the other. After this, any small force applied to one extremity is sufficient to extend this crack through all the whole substance and across the glass; for, since the strain at each instant in the progress of the crack is confined nearly to a mathematical point at the bottom of the fissure, the effort necessary for carrying it through is proportionally small. Dr. Wollaston found by trial that the cut caused by the mere passage of the diamond need not penetrate so much as the two-hundredth part of an inch. He found also that other mineral bodies, recently ground into the same form, are capable of cutting glass; but they cannot long retain that power, from want of the requisite hardness.

HOW TO DISTINGUISH PRECIOUS STONES.

The Diamond and the Garnet are distinguished from all other precious stones by their having only *single refraction*, the others having *double refraction*, or giving a *double* image of a taper or small light when it is viewed through their facets. By the same means all precious stones, except Diamond, Garnet, and Spinelle, are distinguished

from artificial ones by the former having double refraction, and the latter only single refraction. Even when the precious stones are set opaque, that is, when we cannot see through them, it is easy to find whether the refraction is single or double, by looking into the stone at the image reflected from the posterior facets. If any of the precious or artificial stones are immersed in alcohol, or even water, they lose their lustre, while the diamond does not. This arises from their having an inferior refractive, and consequently reflecting power, so that the light reflected from their facets is very small compared with that which comes from the diamond. On a modification of this principle Sir David Brewster has constructed an instrument, which he calls a *lithoscope*, for distinguishing precious stones from one another, and from their imitations.

A well-known though generally ill-practised method of distinguishing precious from artificial stones is, to *touch them with the tongue.* The stone being the best conductor of heat will feel cold, and the glass much less so. The two should, previous to the experiment, be placed close to each other, till they have acquired the same temperature.—*North British Review.*

COLOR OF THE ATMOSPHERE.

The Color of the Atmosphere is only apparent when we look at the sky, or at any distant mountain or forest; and a very simple experiment will explain the cause. If we take any large glass vessel, which contains a deep-colored liquid, and have several glass tubes of different diameters, from an inch to a tenth or twentieth of an inch, and fill these tubes with liquid out of the large vessel; though we have the same liquid in all, it will be seen that the tint will gradually become more faint in proportion as the diameter of the tube is less, until, in the smallest, the liquid is clear and colorless like water. Hence, it will be observed, the intensity of the color is in proportion to the mass; and that a very small quantity of that which in large quantities has a strong color does not present any color at all. This is the case with all semi-transparent substances; a small quantity cannot transmit to the eye a sufficient body of their peculiar color to make an impression, and hence appears colorless.

HEIGHT OF THE ATMOSPHERE.

The Height of our Atmosphere is a question much disputed. M. Biot conceives it to be 18 miles, Sir John Lubbock scarcely 22½ miles;

12

some extend it to 50, others to 80, and Dr. Dick to 200 miles. The great meteor of Feb. 11th, 1850, whose path was so admirably traced by Mr. Glaisher of the Royal Observatory, when first seen in the north of England, was at a height of 90 miles above the earth's surface, finally bursting in Bedfordshire, at an elevation of 23¼ miles; yet the noise resulting from the explosion was so loud as to be heard at the distance of more than 100 miles; not only proving that the body was of great size (Mr. Glaisher calculates it to be three-quarters of a mile in circumference), but that the atmosphere must have extended beyond this elevation. Most likely, the atmosphere extends to the height of about 50 miles; at 37 miles, according to Mrs. Somerville, it is sufficiently dense to reflect the solar rays when 18° below the horizon. The bursting of a meteor, whose diameter was half a mile, which occurred in the year 1783, at a height above the earth's surface of 50 miles, was heard like a cannon, although the air at that elevation is three thousand times lighter than that at the level of the sea.

WEIGHT OF THE ATMOSPHERE.

Pascal shows that all the phenomena and effects hitherto ascribed to the horror of a vacuum arise from the weight of the mass of air; and after explaining the variable pressure of the atmosphere in different localities, and its different states, and its rise of water in pumps, he calculates that the whole mass of air round our globe weighs 8,983,889,440,000,000,000 French pounds.

LIGHT OF THE SEASONS.

The chemical principle of the sun's rays is more active, relatively to heat and light, during the Spring than at any other period of the year. As Summer advances, this power diminishes, and luminous force increases; whilst with the autumn both light and actinism are subdued, but the calorific radiations increased. Thus the conditions of the light of the seasons vary to suit the necessitities of vegetable life.—Robert Hunt.

WHAT IS ACTINISM?

Actinism is a term signifying *ray-power*, which has been adopted for the purpose of expressing the chemical action of the sunbeam. According to the generally received views, the solar ray is regarded as exhibiting three forces: *light*, or luminous power; *heat*, or calorific power; and *actinism*, or chemical power; but whether these be re-

garded as distinct forces, or only as modified forms of one, the three phenomena are essentially dissimilar; hence the necessity of the term actinism, to distinguish the chemical (photographic) phenomena from heat and light.—Robert Hunt.

DOES THE SUN INFLUENCE A FIRE?

There is a common opinion, that the direct action of the rays of the Sun diminishes the combustion of a common fire. This notion has often been ridiculed as erroneous; and, with a view to put it to the test of experiment, Dr. M'Keever ascertained the actual rate of combustion of well-known bodies, in different circumstances. It appears from these trials, that the quantity of wax-taper consumed in broad sunshine, in the open air, is less than that consumed in a darkened room, in the same time, in the proportion of ten to eleven. When the experiment was made with a common mould candle, an inch in length was consumed in fifty-nine minutes, in strong sunshine, temperature eighty degrees; in fifty-six minutes, in a darkened room, temperature sixty-eight degrees. Other trials were made to ascertain the effect of the different colored rays of the prismatic spectrum on combustion, and it was found to proceed most slowly in the verge of the violet ray. The times of consuming the same length of taper in the different portions of the spectrum were, in the red ray, eight minutes; green ray, eight minutes twenty seconds; violet ray, eight minutes thirty-nine seconds; verge of the violet ray, eight minutes fifty-seven seconds. The common opinion is therefore correct; but the difference is not so considerable as might be expected.

THEORY OF THE PUMP.

Air, though comparatively light, is positively heavy, having a weight of its own. A square inch of it, carried up from the surface of the earth to the top of the atmosphere, is no less than 15 lbs. in weight. It is this weight of the atmosphere, 15 lbs. on every square inch, that pushes water into the void left by the updrawn piston of a pump; there is, of course, a limit beyond which it cannot push the water—namely, the point of height at which the column of water in the pump tube is exactly balanced by the weight of the atmosphere. It is just a question of balance: 15 lbs. can support only 15 lbs.,—a thing which every body understands nowadays, thanks to Galileo, Torricelli, and Blaise Pascal, the seer, the discoverer, and the verifier of the fact.

The manner in which water is raised in a common pump was formerly explained by the assumption that nature abhorred a vacuum; and this general expression was applicable to every pump within a certain range. After a time, however, scientific men found that water would only rise to a certain height in pumps, and therefore arrived by induction at the laws of atmospheric pressure.

ECHOES EXPLAINED.

When sound is interrupted by obstacles of sufficient extent and regularity, it is reflected, and produces the phenomenon called an Echo. A wall, the side of a house, the ceiling, floor and wall of an apartment, and an arched roof, give rise to echoes more or less audible. If the reflected sound meet with a second obstacle, it will be again reflected; and thus the echo may be repeated many times in succession, becoming fainter at each repetition, till it dies away altogether.

SOUND AND NOISE.

Philosophers make this distinction between Sound and Noise:—Those actions which are confined to a single shock upon the ear, or a set of actions circumscribed within such limits as not to produce a continued sensation, are called a *noise;* while a succession of actions, which produce a continued sensation, are called a *sound.*

WIND OF A CANNON BALL.

The recent siege of Sebastopol has revived an old controversy as to whether the wind of a cannon ball does injury to persons near the line of passage of the ball, but diametrically opposite opinions are propounded and illustrated by appeals to the personal experiences of the writers. Thus a writer in *Notes and Queries* states that the siege of Sebastopol has proved the impression, that the wind of a cannon-shot does injury, to be a myth. "There have been," he says, "hundreds of instances where cannon-shot have grazed the clothing and person of men, doing no serious injury." The writer was himself grazed by a forty-two-pound shot fired from the Gordon Battery, but the wind of the shot did no injury. On the other hand another writer states, "An officer of the French army, sent to make a reconnoissance in the neighborhood of Sebastopol, was knocked down, not by a cannon-ball itself, but by the wind of it, as the ball passed close to him. The commotion produced was so intense that the tongue of the officer instantly contracted, so that he could not either put it out of his mouth or ar-

ticulate a word. Subsequently, by the aid of electricity, he recovered his speech."

It has been suggested that the impression that an injury is done by the wind of a cannon-ball may be accounted for by the statement of Baron Larrey in his *Clinique Chirurgicale* (Paris, 1829), confirmed by the eminent army surgeon, Samuel Cooper, in his *Elements of Surgery*, that a cannon-ball, especially when nearly spent, frequently strikes the surface of the body or a limb obliquely, and is reflected without breaking the skin. Other writers make similar statements. At the battle of Marston Moor, Cromwell's head was nearly grazed by a cannon-ball, but we hear nothing of the wind.

DRAFT IN CHIMNEYS.

When a fire is lighted in a stove-grate, the air in the chimney over it becomes heated by the fire, and therefore lighter than the external atmosphere, and consequently it ascends. Thus is produced what is called a Draft in the Chimney, which is merely the upward current of air produced by the ascent of the heated air confined in the flue. When a grate has remained for some time without having a fire in it, the chimney, grate, &c. become cold, and when the fire is first lit, it does not heat the air fast enough to produce a current necessary for the draft; and as the smoke will not ascend, it issues into the apartment. This effect is often attributed to the supposed foulness of the chimney instead of the above cause: for after the grate and flue become warm, the draft is restored, and the chimney ceases to smoke.

VENTILATION BY THE CHIMNEY.

A parlor-fire will consume in twelve hours 40 lbs. of coal, the combustion rendering 42,000 gallons of air unfit to support life. Not only is that large amount of deleterious product carried away and rendered innoxious by the chimney, but five times that quantity of air is carried up by the draught, and ventilation thus effectually maintained. The ascent of smoke up a chimney depends on the comparative lightness of the column of air within to that of an equal column without: the longer the chimney, the stronger will be the draught, if the fire be sufficiently great to heat the air; but if the chimney be so long that the air is cooled as it approaches the top, the draught is diminished.—FARADAY.

TO ESTIMATE THE DISTANCE OF A STORM.

Observe how many seconds elapse between a flash of lightning and

the thunder, and multiply them by 1142, the number of feet sound travels in a second; the product will be the distance in feet.—*Illustration.* Saw a flash of lightning five seconds before I heard the thunder: required the distance.

$$\frac{5 + 1142}{3 + 1760} = 1\tfrac{43}{521} \text{ in distance.}$$

In the absence of a watch, the pulsations of the wrist may be counted as seconds, by deducting 1 from every 7 or 8.

Thunder can scarcely be heard more than 20 or 30 miles from the flash which produces it. Lightning, on the other hand, may be seen (or at least the reflection in the clouds, forming "sheet lightning") at a distance of 150 or 200 miles.—SIR JOHN HERSCHEL.

HOW TO MEASURE THE HEIGHT OF A MOUNTAIN.

The Atmosphere is densest near the surface of the earth, because it has to support the weight of the whole column of air above it, which, owing to its being very compressible, compels it to occupy less space. This law of decrease in pressure being known, its application is made use of in the measurement of mountains; for the barometer will indicate a less pressure on the summit than at the base in proportion as it is high. As an instance, let us take the measurement of a mountain:

Barometer at the base	30·00 inches,	Temperature	60°
" " summit	25·70 inches.	"	44°

The mean of these two observations of the barometer is 27·85 inches, their difference 4·30 inches. The mean of the two observations of the thermometer is 52°.

In a table of factors constructed by Sir George Shuckburgh, the factor of 52° is 910·8 feet,

$$\therefore \quad \frac{30 + 4{\cdot}30 + 910{\cdot}8}{27{\cdot}85} = 4218{\cdot}9 \text{ feet.}$$

Therefore 4218·9 feet is the height of the mountain.

Thus the following rule will enable any one to measure a hill with a barometer:

Let x = height of the hill required.

A = mean height of the two barometer observations (that is, at the base and at the summit).

a = the difference of the two barometer observations.

b = the factor in the Table corresponding to the mean of two thermometer observations.

(Barometer at 30 inches.) Then $x = \frac{30ab}{A}$

VELOCITY OF SOUND.

Sir John Herschel calculates, it may be stated in round numbers, that Sound, in dry air, and at the freezing temperature, travels at the rate of 1090 feet, or 363 yards per second of time; that when the thermometer is at 62° Fahrenheit, Sound runs over 9000 feet in eight seconds, 12¾ British standard miles in a minute, or 765 miles in an hour, which is about three-fourths of the diurnal velocity of the earth's equator.

AIRING ROOMS.

It is a common mistake to open all the lower part of the windows of an apartment; whereas, if the upper part, also, were opened, the object would be more speedily effected. Thus, the air in an apartment is generally heated to a higher temperature than the external air, either by the heat supplied by the human body, or by lamps, candles, or fires. This renders it lighter than the external air; and, consequently, the external air will rush in at all openings at the lower part of the room, while the warmer and lighter air passes out at the higher openings. If a candle be held in the doorway near the door, it will be found that the flame will be blown inwards; but, if it be raised nearly the top of the doorway it will be blown outwards. The warm air, in this case, flows out at the top, while the cold air flows in at the bottom.

A current of warm air from the room is generally rushing up the flue of the chimney, if the flue be open, even though there should be no fire lighted in the stove; hence the unwholesomeness of using chimney-boards.

MUSIC OF THE FLUTE.

That it is really the air which is the sounding body in a flute or other wind instrument, appears from the fact, that the materials, thickness, or other peculiarities of the pipe, are of no consequence. A pipe of paper, and one of lead, glass, or wood, provided the dimensions be the same, will produce, under similar circumstances, exactly the same tone as to *pitch*. If the *qualities* of the tones produced by different pipes differ, this is to be attributed to the friction of the air within them, setting in feeble vibration their own proper materials.—SIR JOHN HERSCHEL.

WHAT IS VENTRILOQUISM?

It is now pretty generally admitted that ventriloquism simply consists in a slow and gradual expiration, preceded by a strong and deep

inspiration, by which a considerable quantity of air is introduced into the lungs, which is afterwards acted upon by the flexible powers of the larynx and the trachea. Any person, therefore, by practice, can obtain more or less expertness in this exercise; in which, although not apparently, the voice is still modified by the mouth and tongue. M. Lespagnot has demonstrated that ventriloquists have acquired by practice the power of exercising the veil of the palate in such a manner that, by raising or depressing it, they dilate or contract the inner nostrils. If they are closely contracted, the sound produced is weak, dull, and seems to be more or less distant; if, on the contrary, these cavities are widely dilated, the sound is strengthened by these tortuous infractuosities, and the voice becomes loud, sonorous, and apparently close to us. Thus, any able mimic, who can with facility disguise his voice, with the aid of this power of modifying sounds, may in time become a ventriloquist.—DR. MILLIGEN.

NOISE IN SHELLS.

There are few of us who do not remember the childish wonder we once felt at hearing the resonance produced by placing a sea-shell to the ear,—an effect which fancy has likened to "the roar of the sea." This is caused by the hollow form of the shell and its polished surface, enabling it to receive and return the beatings of all sounds that chance to be trembling in the air around the shell.

HINTS FOR PUBLIC SPEAKERS.

In a large room, nearly square, the best place to speak from is near one corner, with the voice directed diagonally to the opposite corner. In all rooms of common forms, the lowest pitch of voice that will reach across the room will be most audible. In all such rooms, it is better to speak along the length of the room than across it; and a low ceiling will, *cæteris paribus*, convey the sound better than a high one. It is better, generally, to speak from pretty near a wall or pillar, than far away from it. It is desirable that the speaker should speak in the key-note of the room, and evenly, but not loud.

In every case, the separation of the wall-surface into small receptacles, like the private boxes of a theatre, the recesses of a library, or the side-chapels of a Gothic cathedral, is favorable to distinct hearing.—JOHN SCOTT RUSSELL, F. R. S.

BREAKING GLASS BY SOUNDS.—SYMPATHY OF VIBRATIONS.

It is owing to the sympathetic communication of vibrations that

persons with clear and powerful voices have been able to break a large tumbler-glass by singing close to its proper fundamental note. We have heard of a case where a person broke no fewer than twelve large glasses in succession. The sympathy of vibrations, or tendency of one vibrating body to throw another into the same state of vibration, shows itself remarkably in the case of the going of two clocks fixed to the same shelf or wall. It was known, near a century ago, that two clocks set going on the same shelf will affect each other. The pendulum of the clock which is stopped, after a certain time, will resume its vibrations, and in its turn stop that of the other clock. Mr. John Elliot, who first observed these effects, noticed that two clocks, which varied from each other ninety-six seconds a day, agreed to a second for several days when they were placed on the same rail. The slowest of these two clocks, which had a slower pendulum, set the other in motion in sixteen minutes and a half, and stopped itself in thirty-six minutes and a half. These effects are clearly produced by the small vibrations communicated from the one pendulum to the other through the shelf, or rail, or plank, on which they both rest. It has been found that two conflicting sounds produce silence, as two converging rays of light produce darkness.—Sir John Herschel.

SIGNS OF THE WEATHER.

Sir Humphry Davy, in his *Salmonia*, explains several weather proverbs, signs and superstitions. Thus, when the clouds are purple-tinted red in the west, it portends fine weather, because the air, when dry, refracts more red or heat-making rays; and as dry air is not perfectly transparent, they are again reflected in the horizon. A coppery or yellow sunset generally foretells rain; but, as an indication of wet weather approaching, nothing is more certain than a halo round the moon, which is produced by the precipitated water; and the larger the circle, the nearer the clouds, and consequently the more ready to fall.

The old proverb:

"A rainbow in the morning is the shepherd's warning,
A rainbow at night is the shepherd's delight,"

is often correct, because a rainbow commonly occurs when the clouds containing or depositing the rain are opposite to the sun; now, in the evening the rainbow is in the east, and in the morning in the west; and as our heavy rains in this climate are usually brought by the westerly wind, a rainbow in the west indicates that the bad weather

is on the road, by the wind, to us; whereas the rainbow in the east proves that the rain in these clouds is passing from us.

A rainbow, either solar or lunar, indicates the existence of rain when we do not see it fall. The halo 22° tells us that there are crystals of ice floating in the upper part of the atmosphere, even when the temperature is high near the ground. When a white cloud is seen among the colored clouds which appear in the morning and evening, we may safely infer that it is at a great distance from the earth.

When swallows fly high, fine weather is to be expected or continued; but when they fly low, or close to the ground, rain is almost surely approaching; for swallows follow the flies and gnats, which delight in warm strata of air. Now, as warm air is lighter, and usually moister, than cold air, when the warm strata of air are high there is less chance of moisture being thrown down from them by their mixture with cold air; but when the warm and moist air is close to the surface, it is almost certain that, as the cold air flows down into it, a deposition of water will take place.

When sea-gulls assemble on the land, very stormy and rainy weather is approaching. The cause of this migration to the land is the security of these birds finding food; and they may be observed at this time feeding greedily on the earth-worm and larva driven out of the ground by severe floods; whilst the fish on which they prey in fine weather in the sea leave the surface and go deeper in storms. The search after food is the principal cause why animals change their places. The different tribes of the wading birds always migrate when rain is about to take place. The vulture, upon the same principle, follows armies; and the augury of the ancients was doubtless a good deal founded upon the observation of the instincts of birds. There are many superstitions of the vulgar owing to the same source. For anglers, in spring, it is always unlucky to see single magpies; but two may be always regarded as a favorable omen: the reason is, that in cold and stormy weather one magpie alone leaves the nest in search of food, the other remaining sitting upon the eggs or the young ones; but two go out together only when the weather is warm and mild, and favorable for fishing.

The singular connections of causes and effects make superstition less to be wondered at, particularly amongst the vulgar; and when two facts naturally unconnected have been accidentally coincident, it is not singular that this coincidence should have been observed and registered, and that omens of the most absurd kind should be trusted in. In the west of England, about a century ago, a particular hollow noise

on the sea-coast was referred to a spirit or goblin, called Bucca, and was supposed to foretell a shipwreck. Now the philosopher knows that sound travels much faster than currents in the air; and the sound always foretold the approach of a very heavy storm, which seldom takes place on that wild and rocky coast without a shipwreck on some part of the extensive shore surrounded by the Atlantic.*

Arago has left us this important dictum:—"*Whatever may be the progress of the sciences, never will observers who are trustworthy and careful of their reputation, venture to foretell the state of the weather.*"

TO ASCERTAIN THE DIRECTION OF THE WIND.

Mr. T. Stevenson gives the following easily applied method of ascertaining the direction of the wind, by observing the reflected image of the clouds:—

In making some experiments, in which it was necessary to know accurately the direction of the wind, Mr. Stevenson was much annoyed by the insufficiency of vanes and all ordinary methods employed for that purpose. The under currents of air are so numerous and conflicting, more especially in towns, where the houses are lofty, that the author has seen it proclaimed to be due east at one end of the street, while at the other it seems with equal certainty to be coming in a westerly direction. In this dilemma, it occurred to him that a more accurate conclusion might be arrived at, by observing the direction of the different clouds when reflected in a mirror. At first, Mr. Stevenson used a common mirror, placed horizontally, so as to have the sky reflected in it; and having fixed upon a cloud, he watched its progress in the mirror, taking care to keep the eye steadily in one position, and carefully marking the track of the cloud upon the glass with a pencil of soap. When this was done, it was easy, by placing a compass on the mirror, to ascertain the direction of the wind from that of the cloud's path traced on the glass. A more convenient and portable instrument has since been constructed, consisting of an ordinary compass having a silvered disc in the centre of its covering glass of such a size as to allow the points of the needle and the graduated circle of the compass to be seen beyond it. The glass has cross lines cut upon

* In the first book of Kings, ch. xviii., is described a cloud of wind as well as rain: "Behold, there ariseth a little cloud out of the sea, like a man's hand. And it came to pass in the mean while, that the heaven was black with clouds and wind, and there was great a rain." Sir John Chardin informs us that, in his time, great storms were wont to begin with such a kind of cloud, and that it was the sign of them at sea in the Eastern countries.

it, passing through the centre, and drawn so as to correspond with the cardinal points marked on the divided circle. The whole compass can be made to revolve in the horizontal plane, upon a point projecting from the bottom of the outer case. When the cloud which is to be observed has been selected, as near the zenith of the observer as possible, the compass should be gradually turned round until one of the lines upon the glass remains coincident with one well-defined edge of the cloud as it passes across the field of view. The angle indicated by the magnetic needle being then read off, the azimuthal bearing of the cloud's track from the magnetic north is at once ascertained. The convenience of this instrument might be increased by having an eyepiece attached to it, capable of being fixed in such a manner as to point to the intersection of the cross lines in the centre of the circle, so that the eye may be kept steadily in the same direction. By means of an apparatus on the principle of a camera obscura, the direction of the wind could be easily ascertained by observing the compass bearing of the cloud's track. And, in the absence of better instruments, the reflection by a mirror ought certainly in all cases to be preferred to the indication of vanes, whose action must always be vitiated more or less by friction, and perhaps by other causes, besides being liable to be acted upon by currents which have been distorted from their true direction by obstructions due to houses, trees, and the configuration of the earth's surface. The changes of wind and weather so characteristic of our climate, might, perhaps, be more certainly or more speedily predicted by comparing the motions of the clouds in the higher regions of the atmosphere, with those nearer the earth's surface, than from information derived from other sources. Mr. Stevenson has observed a change of wind apparent in the direction of the *high* clouds for two days before the currents near the earth's surface were affected, although they ultimately assumed the same direction. —*Edinburgh Philosophical Journal.*

DIRECTION AND VELOCITY OF THE WINDS.

Professor Airy has found that the wind never blows steadily for any period of time except from eight points of the compass. When in any other quarter, it is merely shifting round to one of these points. It never blows at all directly from the South! The two most prevalent winds are the S. S. W. and W. S. W.; the one of which invariably brings rain, while the other is accompanied by dry weather. Between the W. and N. W. is one point of duration; between the N. and E.

another; and another between the E. and S. S. W., which, with the N., the W., and the E., make the eight points alluded to, from which the wind blows for prolonged periods.

Maltebrun states: The velocity of winds being the circumstance most palpable to our senses, several arbitrary denominations have resulted from it, the principal of which are as follows:

Gentle wind	(a breeze) traverses	10	feet	in a second.
Moderate	. (an easy gale) . . .	16	"	"
Strong .	. (a stiff gale) . . .	24	"	"
Violent .	. (a squall)	35	"	"
Storm	Slight	43	"	"
	Considerable . . .	49	"	"
	Violent	54	"	"
Hurricane	Of the temperate zones	60	"	"
	of the torrid zone.	. 120 to 300.*		

THE EQUINOCTIAL STORM.

The following views respecting the occurrence of a periodic storm, known as the equinoctial, were communicated by Prof. Loomis, to the American Association.

"About twelve years ago, I made a somewhat extensive comparison of meteorological observations, for the purpose of testing various popular notions with regard to the weather. My object particularly was to determine whether any connection could be traced between the fall of rain and the phases of the moon, or the seasons of the year. The result of this investigation was, that many popular proverbs, with regard to the fall of rain, have little foundation in truth. One of the popular beliefs is worthy of note here, for many of the most scientific men have faith in the fall of heavy rain at or about the period of the equinoxes. I propose to inquire whether rain is unusually prevalent about the time of the autumnal equinox? The register to which I first refer, for an answer to this question, is that of the Royal Society of London, which has been accurately kept for a period of 64 years. Comparing the observations for the month of September, including 1920 days, shows that there is annually in London a fall of rain greater

* Horology has enabled us to discover that when the wind passes one mile per hour, it is scarcely perceptible; while at the rate of 100 miles per hour, it acquires sufficient force to tear up trees and destroy the produce of the earth; and without the aid of a seconds clock it would have been scarcely possible to ascertain that a cannon-ball flies at the rate of 600 feet in a second.—Adam Thomson's *Time and Timekeepers*, p. 156.

by one fifth for the last half of the month than the first half. This may be adopted, therefore, as the law for London. But there is no indication that there is a greater fall of rain than might be occasioned by the change of season, and no particular day can be pointed out in the month of September where there ever was, or ever will be, a so-called equinoctial rain. If the number of rainy days, instead of the quantity of rain, is taken into consideration, we arrive at the same result. I will not attempt to conceal that the amount of rain for the five days embracing the equinox is greater than for any other period of five days throughout the month; but if any one should be disposed to attach any special importance to this circumstance, I would remark that the amount of rain for the last five days of the month falls short of the preceding five days by less than three per cent., and that this quantity is too small to afford any satisfactory basis for a conclusion in a research of this kind. Certain it is, that the difference is too small to be detected, without a most careful observation of the rain gauge, and inasmuch as the popular belief on this subject was certainly never derived from meteorological journals, I do not hesitate to conclude that the common opinion of an unusual fall of rain at London about the time of the autumnal equinox, has been taken up without reason.

I now proceed to inquire what foundation there may be for a similar opinion in the United States. And here we encounter a difficulty arising from the want of a continuous register of the fall of rain at a single locality for any long period. In this country, accurate observations extend only over a period of twenty-five years. And these are only known at one point, which is at Albany. "But the great inequalities of these observations show that the period of observation is too short to elucidate any correct results as yet; and that, before arriving at any correct conclusion, we must extend these observations over a long series of years. If the first five days of September be taken, we find 20.62 inches to have fallen; the next five days only 8.81 inches; the third group of five days, 13.34; the fourth group of five days, 13.82; the fifth, 17.16; the sixth, 13.48 inches. It will thus be seen that more rain fell on the first days of September than in any other part of the month. From these figures it would be preposterous to come to the conclusion that the first week in September would be wet, and that the second would be peculiarly dry.

"Another fact worthy of notice is the recorded fact that, for twenty-three successive years, no rain has fallen on the 6th of September in Albany, yet no popular proverb is prevalent in that vicinity noticing

the fact. In order to supply, as far as possible, the want of a series of observations sufficiently long, I have had recourse to the journal of Dr. Holyoke, kept at Salem, Mass., from 1786 to 1828, in which it was recorded, each day, whether it was fair, cloudy or rainy, although the amount of rain was not registered. I have taken the sum of the rainy days for each day of the month, and have appended to this the Albany register, making thus a continuous record for sixty-five years. The greatest number of rainy days in any one day of the month, for the entire period, was twenty-five on the 5th, and the least number was twelve, on the 6th. So far, then, as these observations indicate any influence of the day of the month upon the amount of rain, they lead to the conclusion that the first five days of September are unusually rainy, and the second five days unusually dry. Still, it would be premature to draw definite conclusions from these facts. On the whole, we may conclude that there is as much reliance to be placed on a storm happening in the New England States at the equinox as at the annual meeting of the Quakers; or, in the language of the poet—

"'If the first of July be rainy weather,
It will rain more or less for forty days together.'"

WINDS AND CURRENTS.

The results gained by the "Wind and Current Charts" are numerous. It has been discovered that the trade-winds in the North Atlantic blow with more regularity on the American than on the African side of the Atlantic, owing, probably, to the fact that in the latter case the sands and deserts, which heat and rarify the air, are to the windward, while in the former they are to the leeward. It is also shown that the so-called northeast trade-winds prevail more from the northward on the American, than they do on the African side of the ocean, and that calms are much less frequent on this than on that side of the ocean. After carefully comparing the log-books of many thousand vessels sailing between the United States and Brazil, China, the Indies, the Cape of Good Hope, and Cape Horn, I have been led to the important discovery that the circuitous course usually taken to these places may be avoided. It may here be remarked that the usual route of vessels bound from our Atlantic coast to the parts of the world named, is nearly the same until they reach the equator. But these charts indicate an entirely new route thither. The usual course of our vessels bound to Rio Janeiro, or the Cape of Good Hope, is across the Atlantic Ocean to the shores of Africa, thence to the coast

of Brazil, and, if bound to the Cape, a third time across the ocean. This zigzag course has hitherto been pursued, in the belief that, in following it, better winds have been found than if any other had been taken. The facts derived from the log-books and records of a thousand ships show this belief to be unfounded. It has been made to appear that monsoons, or trade-winds, prevail in that part of the Atlantic through which a part of the old route to the equator lies, where no such winds have been thought to exist. From June to November, inclusive, these winds prevail from the southward and westward. And they are exactly in that part of the ocean where, strange though it may appear, vessels, ever since the days of Cook and Cavendish, have been in the habit of going, with the expectation of finding winds favorable for a course to the southward and westward. By examination a better route has been discovered, which, besides being several hundred miles nearer, lies through a region of more favorable winds: insomuch that the average passage of a number of vessels which have tried this new route is ten days, or about twenty-five per cent. less than the average by the usual course to the equator.

Again, by projecting the courses of large numbers of vessels engaged in the trade of the Gulf of Mexico, and noting the currents they have met with, it has been made to appear more than probable that a current has been discovered, which (if found to exist) will shorten the usual sailing distance from Havana to New Orleans, and to other ports in the States bounding on the gulf, nearly one-third. By the route usually pursued, vessels have to encounter an opposing current running at the rate of nearly sixty miles per day. It is believed that, by following along the Cuba shore, vessels bound to New Orleans will find a current in their favor of equal velocity. It has also been ascertained that the north-east trade-winds form an atmospherical band in the North Atlantic, with surprising regularity of breadth. This band of north-east trades is not, as has been supposed, parallel to the equator. It is parallel to the ecliptic. The manner in which these conclusions are arrived at admits of no more doubt as to these facts, than there is as to the existence of the trade-winds themselves.

Again, Lieut. Herndon has examined the logs of vessels which, in the years 1833, '34, '35, 39, '40, '44, '45 and '46, cruised 429 days in the square from 5° north, to the equator, between the meridians of 80° and 85 west, and whales were found there in quantities in every month except January, February, and March. In the square from 5° north to the equator, between the meridians of 90° and 95° west, he has in like manner examined the logs of vessels which cruised there

in search of whales 190 days in the years 1830, '33, '34, '35, '36, '39, '40, '41, '43, '45 and '46. Some one of these vessels was there in every month of the year, except December; and they saw only a few straggling whales in February and September. It remains to be seen whether this animal revisits annually the same part of the ocean. So far, it seems probable that he does not; though it does not appear that he remains in any one part the year round. What, then, is to regulate his visits from place to place? Probably the abundance of food. —Lieut. Maury.

THE GULF STREAM.

On the seaward line of Charleston, from the shore to sixty miles out, the depth increases gradually till it acquires a depth of one hundred fathoms. But it soon deepens with great rapidity, as if on the side of a mountain, until at about eighty miles out the ocean bottom is more than six hundred and fifty fathoms from the surface. This continues forward less than ten miles, when the depth as suddenly decreases to not more than three hundred and fifty fathoms, which so goes on only a few miles, when it again deepens to about five hundred fathoms, with subsequent fluctuations. There is, therefore, a submerged mountain-peak or ridge between these points of a truly remarkable character. The differences in the temperature vary almost precisely according to the change of contour of the bottom, showing that the temperature at great depths is much modified by the propinquity of the ocean's bed. It appears that the Gulf Stream, while certainly not superficial, does not run to the bottom; for, off Cape Florida, at 1,200 fathoms, the water in summer is of a temperature of 38° Fahr.—a degree below the average winter temperature much further north.

The stream varies its course according to the season, having a more southerly sweep in winter. The stream is more rapid off Cape Hatteras than Cape Canaveral, and never deposits the seaweed, with which it is so plentifully beset, on the western side. This is accounted for by supposing that the stream stands above the general level of the ocean, with its highest point in the centre or axis of the stream, and sloping off like the roof of a house each way. This stream is what modifies so agreeably the climate of Western Europe, and at the same time causes its fogs. Storms that arise on the coast of Africa, trailing westward, fall into its influence, and sweep around its circuit. The Gulf-stream is sensibly affected by the discharge of the waters in winter from the Chesapeake, Delaware, and Hudson.

VELOCITY OF WAVES CAUSED BY AN EARTHQUAKE.

Prof. Bache, in a paper read before the American Association for the Advancement of Science, states that at 9 o'clock on the morning of Dec. 23, 1854, an earthquake occurred at Simoda, on the island of Niphon, Japan, and occasioned the wreck of the Russian frigate Diana, which was then in port. The harbor was first emptied of water, and then came in an enormous wave which again receded and left the harbor dry. This occurred several times.

The United States has self-acting tide gauges at San Francisco and San Diego, which record the rise of the tide upon cylinders turned by clocks; and at San Francisco, 4,800 miles from the scene of the earthquake, the first wave arrived twelve hours and sixteen minutes after it had receded from the harbor of Simoda. It had travelled across the Pacific Ocean at the rate of six miles and a half a minute. The first wave, or rising of the waters, at San Francisco, was seven-tenths of a foot in height, and lasted for about half an hour. It was followed by a series of seven other waves of less magnitude at intervals of an hour each. At San Diego similar phenomena were observed, but, as that port is 400 miles further from Simoda, the waves did not arrive so soon, and were not quite as high.

THE BASIN OF THE ATLANTIC OCEAN.

The Basin of the Atlantic Ocean is a long trough, separating the old world from the new, and extending, probably, from pole to pole. From the top of Chimborazo to the bottom of the Atlantic, at the deepest place yet reached by the plummet in the Northern Atlantic, the distance in a vertical line is nine miles. The deepest part of the North Atlantic is probably somewhere between the Bermudas and the Grand Banks. The waters of the Gulf of Mexico are held in a basin about a mile deep in the deepest part. There is at the bottom of the sea, between Cape Race in Newfoundland and Cape Clear in Ireland, a remarkable steppe, which is already known as the telegraphic plateau. The great circle distance between these two shore-lines is 1,600 miles: the sea along this route is probable nowhere more than 10,000 feet deep.—Lieut. M. F. Maury.

CURRENTS OF THE ATLANTIC.

Lieut. Maury stated, that in studying the system of oceanic circulation he had found it necessary to set out with a very obvious and

simple principle, viz.: that from whatever part of the ocean a current was found to run, to the same part a current of equal volume was obliged to return. Upon this principle was established the whole system of currents and counter-currents. It is not necessary to associate with oceanic currents the idea that they must of necessity, as on land, run from a higher to a lower level. So far from this being the case, some currents of the sea actually run up hill, while others run on a level. The Gulf Stream was of the first class. The bottom of this stream is an inclined plane, running upwards. If the Gulf Stream was 200 fathoms deep in the Florida Pass, and but 100 fathoms off Hatteras, it is evident that the bottom would be uplifted 100 fathoms within that distance, and that, while the bottom of the Gulf Stream was up hill, the top preserved the water level, or nearly so. The currents which run from the Atlantic into the Mediterranean, and from the Indian Ocean into the Red Sea, are the reverse of this. Here the bottom of the current is a water-level, and the top an inclined plane running down hill. The Red Sea, for example, lies for the most part in a rainless and riverless district. It may be compared to a long, narrow trough. It is about 1,000 miles long, extending nearly north and south, from lat. 12° or 18° to the parallel of 30° north. The evaporation from its surface is immense, and may be safely assumed to equal a rate of two-tenths of an inch per day. Now, if we suppose the current which runs into this sea to average from mouth to head twenty miles a day, it would take the water fifty days to reach the head of it. If it lose two-tenths of an inch from its surface daily by evaporation, by the time it reached the Isthmus of Suez it would have lost 10 inches from its surface. Thus the waters of the Red Sea ought to be lower at the Isthmus of Suez than at the Straits of Babelmandel. They ought to be lower from two causes, viz: evaporation and temperature; for the temperature of that sea is necessarily lower at Suez, in latitude 30°, than at Babelmandel, in latitude 18°. To make this quite clear, suppose the channel of the Red Sea to have no water in it, and a wave ten feet high to enter the Straits, and flow up this channel at the rate of 20 miles a day for 50 days, losing daily by evaporation two-tenths of an inch, it is easy to perceive that, at the end of the fiftieth day, it would not be so high, by 10 inches, as it was the first day it commenced to flow. The top of this sea, therefore, is probably an inclined plane. But the salt water, which has lost so much of its freshness by evaporation becomes salter, and therefore heavier. The lighter water at the Straits cannot balance the heavier, colder and salter water at the Isthmus, and therefore the heavier water must either run out as an

under-current, or it must deposit its surplus salt, and thus gradually make the bottom of the Red Sea a salt bed. As we know that this latter process is not going on, we infer that there is from the Red Sea an under or outer current, as from the Mediterranean through the Straits of Gibraltar. The rivers which discharge into the Mediterranean are not sufficient to supply the waste of evaporation, and it is by this under-current that the salt carried in from the ocean is returned to it again; were it not so, the bed of that sea would be a mass of solid salt. Thus it is that, by a system of compensation, the equilibrium of the seas is maintained. It is a remarkable fact,—that, though there be well-known currents which bring immense volumes of water into the Atlantic, we know of none which carry it out again, and which, according to the principles before stated, ought to be found running back from that ocean. The La Plata, the Amazon, the Mississippi, and St. Lawrence, with many other rivers, run into this very small ocean, and it is not probable that all of these waters are taken up from it again by evaporation; "yet the sea is not full." Where does the surplus go? The ice-bearing current from Davis' Straits, which is counter to the Gulf Stream, moves an immense volume of water down towards the equator. The ice-bearing current which runs from the Antarctic region, and passes near Cape Horn into the Atlantic, and the Lagullas current, which sweeps into it around the Cape of Good Hope, both move immense volumes of water, and bear it along also towards the equator. This water must get out again, or the Atlantic would be constantly rising. A part of the Gulf Stream runs around North Cape into the Arctic Ocean. But this current probably performs its circuit of the Arctic Ocean, and returns to the Atlantic with increased volume. The great rivers of Northern America, Asia, and Europe, that empty into the Frozen Ocean, as well as the current from the Pacific into Behring's Straits, all sources of supply, serve to swell the current down from Baffin's Bay through Davis' Straits into the Atlantic. That there is an open water communication, sometimes at least, from Behring's Straits to Baffin's Bay, was all but proved by the results of investigations undertaken at the National Observatory, with regard to the habits, migrations, etc., of the whale. These investigations were conducted in such a manner as to show, by a glance at the chart, in what parts of the ocean, and in what months of the year, whales had and had not been seen. These investigations soon led to the discovery, that to the Right Whale the equator is a wall of fire; that that animal is never found near it, seldom or never within a thousand miles or more of it on either side. This fact led to inquiry of the whalemen,

whether the Right Whale of the northern and of the southern hemispheres was the same animal. The answer was "No." The Right Whale of the latter region, as described by these men, is a small, pale animal, the largest scarcely yielding more than 50 barrels of oil. Whereas, that of the northern region is a large, black animal, yielding frequently to the single fish upwards of 200 barrels. A whale-ship on a voyage through Behring's Straits, found the Right Whale of the North Pacific. This fact induced the further inquiry, as to whether the Right Whale of Behring's Straits, and the Right Whale of Davis' Straits, was the same animal. For since the fact has been established, that the Right Whale of the North Pacific could not cross the equator, and therefore could not get into the North Atlantic by either of the Capes, a reply in the affirmative to this inquiry would be another link in the chain of circumstantial evidence going to prove the existence of a so-called North-west Passage. The answer from the whalemen in this instance was, in effect, "We have not had an opportunity of comparing the two animals, except after long intervals, but, so far as we can judge, they are the same fish." So far as the other facts go, it would appear probable that there is, at times at least, an open water communication between the two straits; for the instincts of the whale, one might suppose, would prevent him from sounding under icebergs, neither could he pass under barriers of great depth or breadth. Seeing then, that water runs through Behring's Straits from the Pacific, as well as round the Capes, into the Atlantic, where is the escape-current from the Atlantic? The trade-winds are the great evaporating winds. They are the winds which, returning from the polar regions, deprived of all the moisture which the hyperborean dew-points could compress from them, first come in contact with the surface of the earth, and consequently with an evaporating surface, where they are first felt as trades, and where, therefore, they are dry winds. Now can the vapor taken up by these winds so increase the saltness of this sea in the trade-wind region as to make the water there, though warmer, yet specifically heavier than that below, and also than that within the regions of variable winds and "constant precipitation?" If so, may we not have the anomaly of a warm under-current in the South Atlantic Ocean, for that is the only place of escape for a counter-current from the Atlantic?

PHYSICS OF THE MISSISSIPPI RIVER.

The mean depth of the Mississippi River at high-water mark is not materially different at Natchez from what it is at Carrollton, though

nearly 300 miles apart. A section of the river at Carrollton, made at high-water of 1849, is 168,226 square feet; and at Vidalia (opposite Natchez) the section is 167,000 feet. The bottom of a uniform channel 400 miles up is about on a level with the bar at the South-west Pass. The rate of fall is not uniform on the surface, but decreases in declivity towards the Gulf, giving a curve of inclination (probably parabolic) to which the Gulf level is a tangent, at the Balize. The mean rate of inclination is 1.80 inch per mile, for the first hundred miles, 2.00 inches for the second hundred, 2.80 inches for the third, and 2.57 for the fourth hundred miles. The low-water curve declivity has a mean descent of 24 in. per mile for the first hundred miles, and 56, 88, and 1.20 inch for the next consecutive three hundred miles: making the total difference of level 21.1 feet, from a point ten miles above Natchez to the Balize. As to depth, depths of 188 feet have been found in some places, but, when the channel is distant from both shores, 125 feet is the usual maximum. A section made in front of Vidalia gave a mean depth of 80.5 feet, with a maximum of about 180, and a like section of high-water channel at Carrollton, gave a mean depth of 71.6 feet. The low-water depth may always be obtained by subtracting the range from high-water. At Vidalia, the range is 51 feet, and at Carrollton 15 feet. The mean depth of the low-water sections would then be 29.5 feet and 56.1 feet. And the sectional areas at low-water give 183,010 square feet for Carrollton, and 108,000 at Vidalia. The uniformity of breadth in the channel is a remarkable feature of the Mississippi River. A great number of measurements from the Balize to Galena, 1,700 miles up the river, give a mean width, including wide places in the bends, of about 1,000 yards; excluding these, 800 yards; and the upper portion of this is wider, including expanses produced by bends and islands, than 1,000 yards; but excluding them, it is the same. The addition of the four great rivers below makes no increase in the breadth of the river. The Missouri, 800 miles above its mouth, is half a mile wide. The result of observations made on drift-wood, show a mean surface velocity at high-water of 2.61 miles per hour at Carrollton, and 2.60 miles per hour at Vidalia; respectively, 3.80 and 3.82 feet per second of time. The one was derived from 176 observations, and the other from 70 observations. At low-water, Carrollton, 1.45 miles per hour, or 2.11 feet per second; at Vidalia, 1.54 miles per hour, or 2.25 feet per second. The mean velocity of mean water, as derived from thirty years' observation, is 2.26 miles per hour, or 2.95 feet per second. From these and other data, a mean discharge is deduced for the last thirty years of 12,250,000,000,000 cubic feet of water

per minute. According to the estimate of Prof. Riddell, the cubic contents of sediments would be by these measurements 4,083,333,333 cubic feet, so that the sediment would cover twelve square miles one foot deep.—C. G. FORSHEY, *in the American Railroad Journal.*

OBSERVATIONS UPON THE DEPTH, &c., OF THE OCEAN.

The maximum depth of the ocean has never yet been ascertained, and never can be by the ordinary mode of sounding. Captain Ross adopted a method of obtaining deep-sea soundings by throwing over a heavy weight to which a small line was attached. By this means he succeeded in penetrating 4,600 fathoms (about 27,000 feet), when the weight broke off without reaching the bottom. Bottom has, however, been obtained frequently, at two and three thousand fathoms. Experiments show that the great valleys of the ocean run at right angles to the ranges near the coast. The basins of the southern hemisphere dip and rise alternately from the equator towards the pole, causing very unequal depths of water. Experiments made by Capt. Wilkes indicate that light penetrates the ocean to the depth of 80 fathoms (480 feet). The depth at which objects cease to be visible to the eye is much less. A pot painted white was let down into the water, and the point of invisibility marked; upon taking it out the point of visibility was marked, and the two were found to vary but a fathom or two. In water at 36° F., the pot disappeared at six fathoms; in water at 76° F., at thirty fathoms; in the Gulf Stream, at twenty-seven fathoms; just outside of it, at twenty-three fathoms. A report made to Lieut. Maury by Lieut. J. C. Walsh, of some observations on the Gulf Stream, made in the schooner Taney, contains many interesting facts. He says,—"Though we did so much less in deep soundings in the Atlantic than expected, owing to the rough weather, bad state of the vessel, and loss of so much wire in the first experiment, nevertheless, the proving the ocean to have a depth of more than 5,700 fathoms (34,200 feet, or more than six statute miles), as was satisfactorily done in this first trial, is alone of much interest and importance. This vast depth, greater than the elevation of any mountain above the surface, and the greatest depth of the ocean ever yet measured, was reached without finding bottom, in latitude 31° 59′ North; longitude 58° 43′ West, on November 15th, 1849. The wire broke at this length, 5,700 fathoms, at the reel. It preserved the exact plumb line throughout the sounding; there was a steady, uniform increase of weight and tension, with no check whatever during any

instant of its descent, which proves that it could not have touched the bottom before the break. It had been very carefully measured and marked, so that the fact that the ocean here is deeper than 5,700 fathoms, can be relied upon as accurate. The time occupied in the descent of the 5,700 fathoms, at the moderate rate it was allowed to go off the reel, was one hour and a half." The investigations upon the under-currents were few in number, and none were made in the Gulf Stream; but enough was done "to warrant the conclusion that the under-currents are generally stronger, setting in various different directions, than those of the surface." The following was the mode practised for testing the under-currents. "The surface-current was first tried by the usual mode (a heavy iron bottle being lowered from a boat to the depth of 80 fathoms); then, for the trial of the under-current, a large chip-log, of the usual form, the arc of it measuring full four feet, and heavily loaded with lead, to make it sink and keep upright, was lowered by a light but strong line, to the depth of 126 fathoms; a barrega was attached as a float, a log-line fastened to this barrega, and the rate of motion of this float, as measured by this log-line and the glass, and the direction as shown by a compass, were assumed as the velocity and set of the under-current. No allowance was made for the drag of the barrega, which was always in a different direction from the surface-current." The temperature of the water at various depths was also a matter of investigation, and the following are some of the results:—May 12, water at surface, 75°; at 50 fathoms, 76°; at 100 fathoms, 69°. May 13, at surface, 77·5°; 50 fathoms, 76.5°; 100 fathoms, 74.5°; 500 fathoms, 58°. May 14, surface, 77°; 1,050 fathoms, 49°. May 18, surface 70°; 100 fathoms, 65°. Entering the Gulf Stream at 37° 22′ N. lat., 71° 26′ W. long., they found a breadth of 71 miles for the Gulf Stream, between those points of latitude and longitude. On May 29, in 33° 58′ N. lat., 72° W. long., "the current was tried at the depth to which the kettle was lowered, 80 fathoms. I found it tended in the same direction as that at 126 fathoms (counter to the surface-current), but at so small a rate that it could hardly be measured; not more than one-tenth of a knot per hour, the float moving at only this small rate, being but one-tenth of the velocity at which it had moved just before, when trying at 126 fathoms. This indicates that the kettle had just penetrated the under-current; and thus, by this means, it would appear practicable to measure the depth of the surface-current, or its point of contact with the counter under-current; 79° was the highest temperature found, when at the same time it was 77° at 50 fathoms, and 74° at 100

fathoms. Its velocity was 2.5 knots per hour, setting N. 77° E. We got out of it in lat. 36° 42′ N., long. 72° 10′ W., bearing from the point of entrance N. 16° E., distant 78 miles; 78 miles, therefore, appears the breadth between these points of latitude and longitude. After leaving the Gulf Stream the water maintained an average temperature of 53° until we reached New York." As to the extent of the Gulf Stream the writer says:—"We discovered the hot waters of the Gulf Stream extending as far East as 72° 10′, in a latitude so far South as 33° 30′. You will notice that whenever we reached that longitude in our various tracks between the latitudes of 33° 30′ and 34° North, we experienced a sudden change of as much as 5° and 6° in the surface temperature, 70° to 76°. This must be a branch of, or offset from the Gulf Stream, being so far to the eastward of the limits hitherto given to it in those latitudes. The current was found to be one knot per hour setting W. N. W., and the under-current at 126 fathoms, one knot setting to the east."

Our measurement by the hydrometer shows that in some parts, if not in most parts of the ocean, the water is specifically lighter at depths than at the surface, when reduced to like temperature, the correction for this difference being applied. I found on one occasion the following large difference:—On December 8, at surface, 1,028.6 (distilled water as standard, held at 1,000); at 200 fathoms, 1,028.4; at 500 fathoms, 1,027.2; all at 60° temperature. This was in latitude 31° 42′ North, longitude 38° 12′ West. The specific gravity generally found at surface appears about 1,028.4 at 60° temperature; and this specific gravity at surface appears, according to our record, more variable than that at depths. The greatest transparency of the water observed was seventeen fathoms, being able to see a large lead painted white, at that depth. This was in latitude 21° 4′ N., longitude 66° 36′ W.

FALL AND VELOCITY OF RIVERS.

The fall of a river influences in part the velocity or force of its current, but not to such an extent that the rate of fall could be taken as a scale for the rate of velocity. The Rhine, Danube, and Elbe, are very rapid rivers, yet they only exhibit a fall of one or two, and very seldom, three feet per mile. The "gentle Tweed," with an average fall of nearly eight feet from the affluence of Biggar water to the sea, is freely navigated by small boats, while a fall of only two feet in the Danube causes the greatest obstacles to navigation. The Severn and

the Shannon are much alike in magnitude; the average descent of the former is 26.6 inches per mile, of the latter only 9 inches; and yet the Severn pursues its course without any rapids or falls, whilst the Shannon forms the magnificent falls of Doonas, equalling the most celebrated in Europe.—A. PETERMAN *in London Transactions of Geological Society.*

LEVELS OF THE ATLANTIC AND PACIFIC OCEANS.

The popular notion which had so long prevailed that the Atlantic Ocean was many feet higher than the Pacific at the Isthmus of Panama, has been formally exploded. Colonel Totten has decided, after a series of careful tidal observations taken at Panama and Aspinwall Bay, and connected by accurate levels along the line of railroad, that the mean height of the two oceans is exactly the same; although, owing to the difference in the rise of tide of both places, there are, of course, times when one of the oceans is higher or lower than the other; but their mean level, that is to say, their height at half-tide, is now proved to be precisely the same.

DECEPTIVE APPEARANCE OF WAVES.

If we observe the Waves continually approaching the shore, we must be convinced that this apparent motion is not one in which the water has any share: for were it so, the waters of the sea would soon be heaped upon the shores and would inundate the adjacent country: but so far from the waters partaking of the apparent motion of the waves in approaching the shore, this motion of the waves continues, even when the waters are retiring. If we observe a flat strand when the tide is ebbing, we shall still find the waves moving towards the shore.

DEPTH TO WHICH THE OCEAN IS DISTURBED BY GALES.

The effect of a gale descends to a comparative small distance below the surface; the sea is probably tranquil at the depth of 200 or 300 feet: were it not so, the water would be turbid, and shell fish would be destroyed. Any thing that diminishes the friction of the wind smooths the surface of the sea; for example, oil, or a small stream of packed ice, which suppresses even a swell. When the air is moist its attraction for water is diminished, and, consequently, so is the friction; hence the sea is not so rough in rainy as in dry weather. —SOMERVILLE'S *Physical Geography.*

SEA-PRESSURE.

In proportion to the descent into the Sea does the pressure of the superior portion on the inferior become greater; and as a column of sea-water, eleven yards in height, is nearly of the same weight as a column of air of an equal base, extending from the surface of the earth to the limit of the atmosphere, it follows that, at a depth of 1100 yards, the water sustains a pressure of 100 atmospheres. How enormous, then, must this pressure be on beds still lower, if the mean depth of the sea, at a distance from the coasts, extends for several miles, as the laws of gravitation seem to indicate!

LIGHTNING, AND ITS EFFECTS.

Two clouds are not necessary for the production of lightning, which is frequently discharged from a solitary clump of vapor, when a connection can be established with the earth. A French Academician, named Marcolle, describes a case where a mere cloudlet, about a foot and a half in diameter, killed a poor woman by dropping a thunderbolt upon her head. It has been shown by Faraday that the electric fluid contained in a single flash might perhaps be supplied by the decomposition of one grain of water alone. M. Arago has divided the lightnings into three sorts. The first includes those where the discharge appears like long luminous lines, bent into angles and zigzags, and varying in complexion from white to blue, purple or red. This kind is known as forked lightning, because it occasionally divides into two branches. Charpentier relates a case where a flash severed into three forks, each of which struck on points several hundred feet apart. Still more numerous furcations have been reported, for it is said that during a tempest at Landerneau and St. Pol de Leon, twenty-four churches were struck, though only three distinct claps were heard. This was eight churches apiece for the three explosions.

The second class of lightning differs from the first in the range of surface over which the flash is diffused, and is designated as sheet lightning. Sometimes it simply gilds the edges of the cloud, whence it leaps; but at others it floods with a lurid radiance, or else suffuses its surface with blushes of a rosy or violet hue.

Lightnings of the third class are remarkable for their eccentricities, and have been made the subject of considerable contention among meteorologists, many of whom have denied their right to be treated as legitimate lightnings, they differ so widely from the ordinary sort of flashes. They exhibit themselves as balls, or globular lumps of fire—

not momentary apparitions, but meteors which take their own time, and travel at a remarkably slow rate. It is this incelerity which gives them their doubtful character, as an electrical bolt is supposed to be one of the leading emblems of velocity.

Lightning, when it meets with an obstruction in its course, frequently shatters the non-conducting object, dispersing and bursting substances asunder in every direction, as if they had been charged with gunpowder. The stone pinnacle of a church in Cornwall was struck by lightning, and one fragment weighing three hundred pounds was hurled sixty yards to the southward, another four hundred yards to the north, and a third to the south-west. In 1838 the topgallant mast of H. M. ship Rodney was literally cut up into chips by a flash of lightning, the sea being strewn with the fragments as if the carpenters had been sweeping their shavings overboard. Sometimes, in striking a tree or mast, the electric fluid will slice it into long shreds or filaments, so that it will appear like a huge broom or a bundle of laths. Lightning bolts will occasionally dash through resisting objects by tearing great openings, as in a Cornish church, where apertures were made in the solid wall of the belfry fourteen inches square and six inches deep, and as truly regular as if cut out by art. In other instances small holes are drilled which are surprising for their perfect circularity of form. Window-panes have been frequently pierced in this fashion, without affecting the rest of the glass. In forming these apertures, a burr or projection is left upon the edges. Juvenile electricians are in the habit of making holes in cards by passing discharges through them, when a burr or projection will be observed on both sides of the orifice. Sometimes a single discharge will produce two holes in a card, each puncture marked by a single burr, one on the upper and the other on the under side of the card. In some instances the results are such as to suggest that a flash may be split up into several fiery filaments before it strikes an object. In 1777 a weathercock of tinned copper was hurled by a thunderbolt from the top of a church in Cremona, and, upon inspection, was found to be pierced with eighteen holes; in nine of them the burr was conspicuous on one side, and in nine it was equally prominent on the other, while the slope of the burr was identical in all.

Among the curiosities of lightning are what is termed "fulgurites," or tubes, which the lightning constructs when it falls upon a silicious spot, by fusing the sand. They may be called casts of thunderbolts. In some hillocks of sand in Cumberland, England, these hollow tubes have been found from one-fiftieth to two inches in diameter, tapering

perhaps to a mere point. The entire extent of the tubes may be thirty feet, but they usually separate into numerous branches, and have the appearance of the skeleton of an inverted tree. They are lined with glass, as smooth and perfect as if it had been made in a glass-house.—*British Quarterly Review.*

PRECAUTIONS AGAINST LIGHTNING.

Franklin has given some precepts for the use of such persons as, during thunder-storms, are in houses not provided with lightning-conductors. He recommends them to avoid the neighborhood of fire-places. Lightning does, indeed, often enter by the chimney, on account of the internal coating of soot, which is one of the bodies for which, as for metals, lightning evinces a preference. For the same reason, avoid, as much as possible, metals, gildings, and mirrors on account of their quicksilver. The best place is in the middle of the room; unless, indeed, there should be a lamp or chandelier hanging from the ceiling. The less the contact with the walls or the floor, the less the danger. A hammock suspended by silken cords in the middle of a large room would be the safest place. In the absence of means of suspension, the next best place is on substances which are bad conductors, such as glass, pitch, or several mattresses. These precautions must be supposed to diminish the danger; but they do not altogether remove it. There have been instances of glass, pitch, and several thicknesses of mattresses, being traversed by lightning. It should also be understood that, if the lightning does not find round the room a continuity of metal which it may follow, it may dart from one point to another diametrically opposite, and thus encounter persons in the middle of the room, even if they are suspended in hammocks.—*Arago's Meteorological Essays.*

WHAT ARE LIGHTNING CONDUCTORS?

In a report made to Parliament in 1855, by Sir W. Snow Harris, he thus refutes the fallacy of the vulgar and unphilosophical assumption that Lightning-rods "attract" the lightning, and so act as efficient safeguards: It is proved by an extensive induction of facts and a large generalization in the application of metallic conductors, that metallic substances have not exclusively in themselves any more attractive influence for the agency of lightning than other kinds of common matter; but that, on the contrary, by confining and restraining the electrical discharge within a very narrow limit, the application of a small rod or wire of metal to a given portion of a building is, in reality,

highly objectionable. Besides, the application of an ordinary lightning-rod is of a very partial character: it has small electrical capacity, and is very often knocked to pieces by heavy discharges of lightning. To secure such a building as the New Palace at Westminster against lightning, Sir W. Snow Harris considers it requisite to complete the general conductibility of the whole mass, and so bring it into that passive or non-resisting state which it would assume in respect of the electrical discharge, supposing the whole were a complete mass of metal; by which means a discharge of lightning, in striking upon any given point of the building, would have, through the instrumentality of capacious electrical conductors, unlimited room for expansion upon the surface of the earth in all directions to which, by a law of nature, the discharge is determined.

ANTIQUITY OF LIGHTNING-CONDUCTORS.

The art of bringing down lightning from the heavens seems to have been the only charm which the ancients possessed; and M. Salverte, in his work on the Occult Sciences, shows a probability that the ancients defended their buildings from lightning by conductors, and that the Temple of Solomon was thus protected.

FORCE OF LIGHTNING.

In August, 1846, St. George's church, at Leicester, England, was entirely destroyed by the effects of a thunderstorm! The steeple was burst asunder, and parts of it were blown thirty feet; while the vane-rod and top part of the spire fell perpendicularly down, carrying with it every floor in the tower. Mr. Highton, in comparing the power of this discharge of lightning with some known mechanical force, states, that one hundred tons of stone were blown a distance of thirty feet in three seconds; consequently a 12,220 horse-power engine would have been required to resist the effects of this single flash.

ON THE FORM OF LIGHTNING.

Mr. Nasmyth, at the meeting of the British Association in 1856, stated that the form usually attributed to lightning by painters and in works of art, was very different from that which he had observed as exhibited in nature, and from observing this he was induced to call attention to it. He believed the error of the artists originated in the form given to the thunderbolt in the hand of Jupiter as sculptured by

the early Greeks. The form of lightning as exhibited in nature was simply an irregular curved line, shooting from the earth below to the cloud above, and often continued from the cloud downwards again to another distant part of the earth. This appearance, he conceived, was the result of the rapidly shooting-point of light which constituted the true lightning, leaving on the eye the impression of the path it traced. In very intense lightning, he had also observed offshoots of an arborescent form to proceed, at several places, from the primary track of the flash.

This communication gave rise to an animated discussion, as to whether or not the flash of lightning was the effect of a rapidly moving point of light, and if so, whether the direction was, as stated by Mr. Nasmyth, in nine cases out of ten from the earth to the cloud, or the contrary. Mr. Nasmyth adduced the manner in which leaden pipes were burst, they being bad conductors of electricity, as proofs of his views—of which he instanced one which had been burst in several places, from the bottom to the top, in Edinburgh, during a thunderstorm, the pieces of which Sir J. Leslie had obtained and placed in his physical class-room. On being questioned, however, by some members of the section, as to how these distant burstings outwards along the pipe gave any indication of the direction, it did not appear there were any decisive marks indicating this.

CAUSES OF CHAIN-LIGHTNING

In a paper recently communicated to the Royal Society, Mr. Grove stated, and proved by experiment, that the effects of rarefaction upon gases, either produced by the air-pump or by heat, tend to render discharges of electricity more facile, and to enable them to pass across much larger spaces than would otherwise be the case. So strikingly was this evidenced with flame, that when the flame of a spirit-lamp was he'd near one of the terminal points of a coil apparatus, the terminals being separated to a distance far beyond that at which the spark would pass in cold air, the spark darted to and along the margin of the flame, and could be curved or twisted about in any direction, at the will of the experimenter, giving a perfect illustration of the crooked form of lightning, and of the probable reason why it does not pass in straight lines—the temperature of the air being different at different points in its passage, and much of this variation of temperature being in all probability occasioned by the mechanical effects of the discharge upon the air.

SENSATION OF HEAT.

There cannot be a more fallacious means of estimating Heat than by the touch. Thus, in the ordinary state of an apartment at any season of the year, the objects which are in it have all the same temperature; and yet to the touch they will feel warm or cold in different degrees: the metallic objects will be coldest; stone and marble, less so; wood, still less so; and carpeting and woollen objects will feel warm. Now, all these objects are exactly at the same temperature, as may be ascertained by the thermometer.

COLD THAW.

In our northern latitudes persons are apt to remark that certain weather is too Cold for Thaw, when ice and snow are disappearing around them. This sensation of cold is caused by the absorption of heat in the process of liquefaction: for the ice, in dissolving, takes all the sensible heat of the air and all surrounding objects, and renders it latent. The atmosphere, and every object in it, may thus, in a thaw, be kept at the temperature of 32°; an elevation above that temperature being prevented by the liquefaction of the ice.

WOOLLEN CLOTHING.

It is not generally understood how clothing keeps the body cool in hot weather, and warm in cold weather. Clothes are, generally, composed of some light substance, which do not conduct heat; but woollen substances are worse conductors than those which are made of cotton or linen. Thus, a flannel shirt more effectually intercepts or keeps out heat than a linen or cotton one; and whether in warm or in cold climates, attains the end of clothing more effectually. The exchange of woollen for cotton under-shirts in hot weather, is, therefore, an error. This is further proved by ice being preserved from melting when it is wrapped in blankets, which retard, for a long time, the approach of heat to it. These considerations show the error of supposing there to be a positive warmth in the materials of clothing. "The thick cloak which guards a Spaniard against the cold of winter, is also, in summer, used by him as protection against the direct rays of the sun; and while in northern latitudes flannel is our warmest article of dress, yet we cannot more effectually preserve ice, than by wrapping the vessel containing it in many folds of the softest flannel."

Black cloths are known to be very warm in the sun; but they are

far from being so in the shade, especially in cold weather, when the temperature of the air is below that of the surface of the skin.

WARMTH OF THE SNOW BLANKET.

Much controversy existed as to the Warmth imparted to the earth by a covering of Snow, until M. Boussingault, during the winter of 1841–2, found that a thermometer plunged in snow to the depth of a decimetre (about four inches) sometimes marked nine degrees of heat greater than at the surface.—Arago.

THE NEARER THE SUN THE GREATER THE COLD.

This phenomenon is explained by the sunbeams bringing to the earth both light and heat as they descend to warm the hottest valleys or plains, and passing through the upper strata of the atmosphere, but leaving them always of a temperature much below freezing. This low temperature is proved by the fact, that all lofty mountains, even under the equator, are capped with never-melting snows; and that the higher the peaks are, though, therefore, the nearer to the sun, the colder they are. Thus aeronauts, in their balloon-car, if they mounted very high, would be frozen to death if not protected by very warm clothing. Another fact of the very same kind is, that a glass globe full of cold water, or even a ball of ice, will, in the sun's rays, act as a burning lens.—Dr. Neil Arnott.

TEMPERATURE OF THE INTERIOR OF THE EARTH.

The increase of Temperature observed is about 1° Fahrenheit for every fifteen yards of descent. In all probability, however, the increase will be found to be in a geometrical progression as investigation is extended; in which case the present crust will be found to be much thinner than we have calculated it to be. And should this be found to be correct, the igneous theory will become a subject of much more importance, in a geological point of view, than we are at present disposed to consider it. Taking, then, as correct, the present observed rate of increase, the temperature would be as follows:

Water will boil at the depth of 2,430 yards.
Lead melts at the depth of 8,400 yards.
There is red heat at the depth of 7 miles.
Gold melts at 21 miles.
Cast iron at 74 miles.
Soft iron at 97 miles

And at the depth of 100 miles there is a temperature equal to the greatest artificial heat yet observed; a temperature capable of fusing platina, porcelain, and indeed every refractory substance we are acquainted with. These temperatures are calculated from Guyton Morveau's corrected scale of Wedgwood's pyrometer; and if we adopt them, we find that the earth is fluid at the depth of 100 miles from the surface; and that even in its present state very little more than the soil on which we tread is fit for the habitation of organized beings.

PERMANANCE OF THE MEAN TEMPERATURE OF ANY PLACE.

When we consider the numerous and rapid changes of temperature which take place in our climate, it is a remarkable fact that the mean temperature of a place remains nearly the same. The winter may be unusually cold, or the summer unusually hot, while the mean temperature has varied less than a degree. A very warm summer is therefore likely to be accompanied with a cold winter, and, in general, if we have any long period of cold weather, we may expect a similar period at a higher temperature. In general, however, in the same locality the relative distribution of heat over summer and winter undergoes comparatively small variations, and therefore every point of the globe has an average climate, though it is occasionally disturbed by distant atmospheric changes.—*North British Review*, *May*, 1856.

EFFECT OF HEAT, &c., UPON BUNKER HILL MONUMENT.

In the experiment of swinging a pendulum in the shaft of Bunker Hill Monument, for the purpose of illustrating the experiment of Foucault, it was observed that the ball of the pendulum, when at rest, was not always over the same point in the floor. The careful consideration of all the conditions of this fact resulted in ascribing it to the unequal expansion of the sides of the monument, in consequence of unequal exposure to the sun. Upon observing carefully, it was found during clear days that the motion of the ball in the morning was to the westward, at noon to the north-west, and at evening to the east. It was further observed that on days when the sun was obscured by clouds, no motion of the ball on its index-point occurred. It was still further observed on one occasion, during a sudden shower, accompanied with strong wind from the south-east, to move in the space of a very few minutes a quarter of an inch to the eastward. Observations were recorded through several weeks, and no doubt remains that a cause coincident with the sun in its progress produced the variations

of the perpendicular in the monument. The extreme departure of the ball from the centre was to the west of north-west; not to the north, as might at first glance be supposed. The explanation is found in the position of the monument. Its sides do not face the cardinal points, but are inclined about 20°. The expansion of a single side would produce inclination in a direction perpendicular to the side. The expansion of two adjacent sides would produce inclination in the direction of the diagonal. In the morning the shaft is inclined to the westward. At noon it is inclined but little to the north of west. In the progress of the afternoon, it sweeps over twice the amount of movement in the morning; describing, in the twelve hours of observation, an arc of an ellipse. During the night it sets back to the centre, and before seven o'clock in the morning has already moved westward. The greatest diameter of the irregular ellipse, described by the index in twenty-four hours, is ordinarily less than half an inch, while the least was less than a quarter of an inch. The heat of the sun penetrates to but a moderate depth. This is evident from the prompt movement of the column when a shower falls only upon the more highly heated sides, and also from the ready change in inclination as the day advances.

GLASS BROKEN BY HOT WATER.

No person would be so indiscreet as to hazard the breaking of glass by pouring hot water upon it if he but understood the simple means of accounting for its destruction. It is as follows: "If hot water be poured into a glass with a round bottom, the expansion produced by the heat of the water will cause the bottom of the glass to enlarge; while the sides, which are not heated, retain their former dimensions, and, consequently, if the heat be sufficiently intense, the bottom will be forced from the sides, and a crack or flaw will surround that part of the glass by which the sides are united to the bottom. If, however, the glass be previously washed with a little warm water, so that the whole is gradually heated, and, therefore gradually expanded, then the hot water may be poured in without danger; because, although the bottom will expand as before, yet the sides also enlarge, and the whole vessel undergoes a similar change of heat."

STEAM FROM THE KETTLE.

The steam which issues from the spout of a tea-kettle is no hotter, as measured by a thermometer, than the boiling liquid within; yet when condensed in a body of cold water or ice, it gives out as much heat as one thousand times its weight of boiling water would do. This heat

of steam, which is insensible to the thermometer, is called latent heat, and it differs in quantity for different kinds of vapor.—Dr. Ure.

THE BEST METHOD OF ARRESTING FIRES.

On the first discovery of a fire, it is of the utmost consequence to shut, and keep shut, all doors, windows, or other openings. If the fire appears at all serious, and there are fire-engines at a reasonable distance, it is best to await their arrival, as many buildings have been lost from opening the doors, and attempting to extinguish fires with inadequate means. If no engines are within reach, it is well to keep a hand-pump. If that is not to be had, the next best thing is to collect as many buckets outside the room on fire as can be obtained, keeping the door shut; then creep into the room on the hands and knees (if the heat and smoke are considerable), and throw the water as nearly in the direction of the fire as possible, keeping the door shut while more water is being collected. The police of London understand shutting up fires so well, that they have in many instances kept fires two or three miles distant from the engine stations shut up till the firemen arrived in time to extinguish them.

EXPLANATION OF THE TRICKS OF FIRE-JUGGLERS.

M. Boutigny states in the "Comptes Rendus," that, his attention having been turned to the "Spheroidal state of bodies," he suspected that this would account for many of the wonderful feats described, such as walking barefooted across liquid metal, plunging the hand into molten lead, &c., and he proceeded to make some experiments. "I divided or cut with my hand a jet of melted metal of five centimetres, which escaped by the trap. I immediately plunged the other hand into a pot filled with incandescent metal, which was truly fearful to look at. I involuntarily shuddered, but both hands came out of the ordeal victorious. I shall of course be asked what are the precautions necessary to prevent the disorganizing action of the incandescent mass? I answer none. Have no fear, make the experiment with confidence, pass the hand rapidly, but not too much so, in the metal in full fusion. If the experiment were performed with fear, or with too great rapidity, the repulsive force which exists in incandescent bodies might be overcome, and thus the contact with the skin be effected, so that harm and pain would result. To form a conception of the danger and pain there would be in thus passing the hand too rapidly into the metal infusion, it will suffice to recollect that the resistance is proportionate to the

square of the velocity, and in so compact a fluid as liquid iron, this resistance increases, certainly, in a higher ratio. The experiment succeeds especially when the skin is humid; and the involuntary dread which one feels at facing these masses of fire almost always puts the body into that state of moisture so necessary for success; but, by taking some precautions, one becomes veritably invulnerable. The following is what has succeeded best with me. I rub my hands with soap, so as to give them a polished surface; then, at the moment of making the experiment, I dip my hands into a cold solution of sal-ammoniac saturated with sulphuric acid, or simply into water containing some sal-ammoniac, and in default of that, into fresh water." In explaining the theory of these extraordinary results, M. Boutigny says, "I think that I have established, a long time ago, the fact that water in the spheroidal state has the property of reflecting radiating heat, and that its temperature never attains that of its ebullition; whence it follows, that the finger or hand, being humid, cannot rise to the temperature of 100° centigrade, the experiment not continuing long enough to permit the humidity to evaporate entirely. Indeed, there is no contact between the hand and the metal; this, in my estimation, is a fact positively established. If there is no contact, the heating can only take place by radiation; this is enormous, it must be acknowledged, but if the radiation is annulled by reflection, and it is so, it is as if it did not exist. To recapitulate what I have stated: in passing the hand into any metal infusion, it becomes isolated: the humidity which covers it passes into the spheroidal state, reflects the radiating caloric, and does not become heated enough to boil. This is all with reference to the spheroidal theory. I have often repeated the experiments with lead, bronze, &c." In a later number of the "Comptes Rendus," M. Boutigny details some further experiments. "I moistened my forefinger, which I plunged into a bath of lead, when I experienced the same feeling of warmth which water gives in a spheroidal state. When I used alcohol for moistening my fingers, the effect was the same; but when ether was used there was no sensation of heat, but, on the contrary, an agreeable feeling of coolness. I have repeated this experiment several times, and do not hesitate to declare that it is perfectly harmless, and that the most delicate female could do the same, not only without the least danger, but without the slightest inconvenience. But the finger should be plunged in as soon as it is moistened, and when the metal is perfectly liquid. It should be mentioned, that the portions of the hand which are not immerged in the fused metal, but are exposed to the action of the heat radiated from its surface, experience a painful sensation of heat.

STEEPNESS OF MOUNTAINS.

One side of a mountain-range is usually more precipitous than the other, but there is nothing in which the imagination misleads the judgment more than in estimating the steepness of a declivity. In the whole range of the Alps there is not a single rock which has 1,600 feet of perpendicular height, or a vertical slope of 90°. The declivity of Mount Blanc towards the Allée Blanche, precipitous as it seems, does not amount to 45°; and the mean inclination of the Peak of Teneriffe, according to Baron Humboldt, is only 12° 30′. The Silla of Caraccas, which rises precipitously from the Caribbean Sea, at an angle of 53° 28′, to the height of between six and seven thousand feet, is a majestic instance of the nearest approach to perpendicularity of any great height yet known.—SOMERVILLE'S *Physical Geography.*

COSTLINESS OF THE ELECTRIC LIGHT.

There is one serious drawback against the use of Voltaic Electricity for the purpose of illumination, and that is its serious expense. It is a primary law of nature, that no power can be obtained without a corresponding change of matter. In voltaic batteries, the combination of zinc with the oxygen of water constitutes the change of matter which gives rise to electricity. As much dearer as zinc is than coal gas, so is the cost of the voltaic light over the ordinary mode of illumination. But the expense is even still greater, inasmuch as the equivalent of zinc is five times higher than that of carbon; and furthermore carbon combines with two equivalents of oxygen to form carbonic acid. For this reason the Electric Light will, probably, for ever remain a pretty scientific toy; unless, indeed, some person shall have the good fortune to discover a battery with a carbon positive pole.—A. SMEE, F. R. S.

DUCTILITY OF GOLD AND SILVER.

A single grain of gold may be beat into an extent of several square feet, and yet the leaf remain so compact, as not to transmit the rays of light; and Dr. Halleg found that a small cube of gold, whose side is the 1-100th part of an inch only, contains 2,433,000 visible parts. M. Reaumur shows that in the common way of drawing gold-wire, a cylinder of silver 22 inches long and one and a half inch in diameter is stretched to 1,163,520 feet, or is 634,692 times longer than before, which amounts to about 97 leagues. To wind this thread on silk, for use, it is first flattened, in doing which it stretches at least one seventh further, so

that the 22 inches are now 111 leagues; but in the flattening, instead of one seventh, it could be stretched one fourth, which would bring it to 120 leagues.—Dr. MAUNDER.

MEMORANDA UPON WAR AND ITS OPERATIONS.

The most destructive and scientific arm of the service, is horse, or flying artillery; the performances of a troop of which are sometimes astonishing. A battery of horse artillery is in fact a beautiful machine, composed of a great number and variety of parts. Say it is a battery, of six nine-pounder guns with their concomitants. It is waited upon by one hundred and ninety men and one hundred and seventy horses,—augmented, during the late war, to one hundred and eighty-two horses. Among the men we find six officers; that is, the captain of the troop, a second captain, three lieutenants, and one assistant surgeon—there being no want of medical aid for such an important arm. Then there are two experienced staff-sergeants, and thirteen other non-commissioned officers. The gunners and drivers form the greater portion of the privates, amounting to about one hundred and sixty men. The residue is made up of two trumpeters, to transmit the signals which are given to them by word of mouth from the officers; a farrier; four shoeing smiths (each horse requires twelve sets of shoes a year); two wheelwrights; and two collar-makers, with some others. Of the horses, two each are allowed to the officers; there are four to spare; and the rest are attached, with their riders, to the nine-pounder guns for firing solid shot; the twenty-four pounder howitzer for firing shells, which accompanies them; the ammunition wagon; the store limber wagon; the store cart; the forge wagon; and the rocket and spare gun carriages. The list of the articles carried with the guns and wagons is a long one. Twelve-pounder rockets are destruction against troops at eight hundred to a thousand yards' range, and against buildings at six hundred yards. They are especially useful to frighten horses; but they require careful management; without which they are as destructive to friend as to foe. On this train the heaviest load is a twenty-four pounder, on carriage complete, for which ten or twelve horses are required. The wonderfully rapid evolutions of this expert corps ought to be witnessed on a review-day at their head-quarters, Woolwich. On one occasion, we are told, a troop advanced five hundred yards (more than a quarter of a mile) fired two rounds, retired five hundred yards, and fired one round in three minutes and four seconds. To appreciate this feat, it is necessary to remember that, besides getting over the ground, at each halt the guns have to be unlimbered, loaded,

pointed, fixed and limbered up again. A ricochet fire should be tried as much as possible; that is, the shot should be made to graze the surface at a ground-hop, and then fly off again—like a boy playing at ducks and drakes in the water. It will sometimes hit the ground ten, fifteen, twenty times, and more. The most elevated positions are not the best for artillery, for the greatest effects are produced at a height equal to one-hundredth part of the range of the shot. When carrying a non-commissioned officer, the weight of the man and his appointment is reckoned at two hundred and forty pounds. This is less than for a heavy dragoon-horse; which, on ordinary occasions, carries two hundred and sixty-three pounds, exclusive of six pounds ration for the man, and twenty pounds ration for the beast. Troop horses are not altogether teetotallers. They find a wine-glass of spirits in half a pint of water a very refreshing cordial. They are very fond of sweets also. In the Peninsular war, they throve remarkably well on a daily ration of eight pounds of sugar and seven pounds of hay, with no corn. When their drinking-water is hard, a knob of clay mixed with it softens it.

Six horses with a nine-pounder can march four miles in one hour and a half, or sixteen miles in ten hours, allowing for periodical halts. The trot is put at the rate of seven miles, and the gallop at eleven miles an hour. The order of march of an army is this,—infantry, artillery, baggage, cavalry; and a column of thirty thousand men thus disposed, would occupy three miles, and would require two hours at least to range in two lines of battle. A day's march with the lightly armed Romans was eighteen and a half miles; but, for ordinary armies in modern times fifteen miles is allowed, in consideration of the artillery, baggage, and other impediments. But we must not overlook what can be done on extraordinary emergencies.

For instance, General Crawford astonished even the Duke of Wellington, when he joined him after the battle of Talavera, with his light brigade, having marched sixty-two miles in twenty-six hours. Lord Lake's cavalry gallop of seventy-three miles, to the scene of Holkar's defeat at Furruckabad, was performed in the same number of hours. In forced marches, the greatest obstacle to the infantry is blistered feet. The ordinary quick step is equal to three miles an hour; but this rate cannot be kept up after the first hour or two. Double quick is at the rate of seven miles an hour. On parade, a military pace is thirty inches, two thousand one hundred and twelve of which equal a mile.

It is calculated that if the enemy's cavalry are one thousand yards off when they begin to move, they will take about seven minutes to

come up—first at a gentle trot, then at a round trot, and finally at a gallop; and during this interval, each gun can discharge at them, with great precision, ten rounds of round shot and four of case shot (that is, shot put up into a cylinder); or about one round every half minute. This is exclusive of the fire of infantry with their small arms.

At two thousand yards off a single man or horse looks like a dot; at twelve hundred yards infantry can be distinguished from cavalry; at nine hundred the movements become clear; at seven hundred and fifty yards heads of columns can be made out. Infantry marching send out strong lights, and, if the reflection be brilliant, it is probable that they are marching towards you. The dust raised by cavalry and artillery forms a thick cloud; but this is fainter when caused by infantry.

The fascine is a large fagot, the full size of which is eighteen feet, and the weight one hundred and forty pounds: the gabion is a coarse basket, a foot and three-quarters to two feet and three-quarters high, weighing when filled forty pounds. Along with tarred sand-bags, these are used in immense quantities, to build up the extempore walls of batteries, made on the same principle as the field-works. It is the proper business of the sappers and miners of the engineer department to construct such batteries, and it is usually performed at night-time, that the men may be less exposed to the enemy's fire. Working parties are at the rate of eleven to fourteen per gun, assisted by volunteers from the rest of the army.

During some elaborate experiments made in 1834, at the great artillery school at Metz, a thirty-six-pounder, with only one-third charge, at one thousand yards, penetrated twelve inches into good rubble masonry; thirty-one inches into sound oak, and nearly six feet into a mass of earth, sand and clay. An eight-inch shell penetrates twenty-three feet into compact earth. One thirteen-inch mortar, at an angle of 45°, with a charge of twenty-five pounds, ranged four thousand eight hundred and fifty yards. Weak powder is improved by heating it. Exposure to the sun is useful. Double shotting is chiefly practised in the navy. It would seem easy to sink a ship by hitting her below water; but in fact, the resistance of the water is so great that a shot can hardly penetrate it; and the only way to damage the ship is to hit her when she heels over.

Steamers with their machinery below the water line are as safe as sailing vessels; even many holes in the funnel are of slight consequence.

The smooth-bored percussion musket will fire sixty rounds in thirty minutes, and carry two hundred yards. The carbines used by the artillery and cavalry carry one hundred and fifty yards. These, however, are nothing to the new rifle muskets and carbines with Minié balls, which are good at eight hundred to one thousand yards. Artillery do not need carbines carrying beyond three hundred yards, as their heavy ordnance effectually keeps the enemy at a respectful distance.

Distance can be accurately reckoned by sound. The flash of a gun is seen before the report is heard; multiply every second of that interval by three hundred and eighty yards, every beat of the pulse in health by three hundred and four yards, and you get the exact distance of yourself from the gun. What is called a division of an army is a force of from five to ten thousand men, in command of a general, and made up of two or three brigades of three or four regiments each of infantry, two or three gun-batteries of six pieces each, and a proportion of cavalry. In reckoning their number, it is customary to deduct ten per cent. sick or disabled; so that five regiments of say eight hundred each would represent three thousand six hundred fighting men actually in the field. A division in line of battle is posted in two lines, one in rear of the other, with the cavalry behind, and a reserve of guns and one or two regiments behind these, to be kept fresh in case of need. Some idea of the extent of a line may be gathered from these numbers: a regiment of eight hundred stretches two hundred and fifty yards; a division of three brigades, seven hundred and thirty-five yards, allowing for spaces between; and a regiment of cavalry, four hundred yards. The guns are posted in front, or at the flanks, at each end of the line; the right flank and wing being at your right hand as you *face* the enemy, the left flank at your left hand. Generally, the artillery have the honor to begin the encounter, supported by the fire of infantry. When the former have done sufficient execution, the latter advance with the bayonet to complete the business; and when the enemy is disorganized, or in flight, cavalry follow up the blow and dart off in pursuit. Artillery are usually employed opposite artillery, cavalry against cavalry, and so on, according to circumstances.—*Household Words.*

VELOCITY OF WATER-WHEELS IN THE NIGHT.

We are not aware that any popular notion is more extensively diffused among millers, (though many of them may not believe in it,) than that which ascribes a greater Velocity in the Night than in the

day to a Water-wheel under the same head. Why there should be any difference, none of the believers in this doctrine have ever been able satisfactorily to explain. To argue against it has been futile, because early prejudice was stronger than the powers of reason; and, therefore, no other way remained that could prove effectual, but to bring it to the test of experiment. For this labor we are indebted to Professor Cleaveland. His statement, which follows, is contained in a letter to Professor Silliman, and published in the *American Journal of Science and the Arts*:—"In a former letter, I mentioned the opinion existing in this part of the country, that saw-mills move faster during the night than the day. The explanation usually given by the workmen is, that the air becomes heavier after sunset. I selected a fine day in August, and requested that all the mill-gates might remain stationary for twelve hours. At two o'clock P. M. I suspended a barometer in the mill; the pressure of the atmosphere was equal to 30·19 inches; the temperature of the water just before it passed the mill-gate was 72° Fahr. The log was then detached from the saw, and the number of the revolutions of the wheel, being repeatedly counted by different persons, was ninety-six in a minute. At midnight, I again visited the same mill. The barometer stood at 30·26 inches, the pressure of the atmosphere having increased seven-hundredths of an inch. The temperature of the water was 72°, the same as at the preceding observation, although it had been a little higher during the afternoon. The log being detached as before, the wheel was found to revolve precisely ninety-six times in a minute, showing the same velocity as at the preceding noon. The depth of the water was the same during both experiments. The workmen were satisfied that the result of the experiment was correct, but still they seemed to believe that it would be different in a cloudy night."

ECONOMY OF CHEMISTRY.

The Chemistry of Art, like a prudent housewife, economizes every scrap. The horse-shoe nails dropped in the streets during the daily traffic are carefully collected by her, and re-appear in the form of swords and guns. The clippings of the travelling tinker are mixed with the parings of horse's hoofs from the smithy, or the cast-off woollen garments of the poorest inhabitants of a sister isle, and soon afterwards, in the form of dyes of brightest blue, grace the dress of courtly dames. The main ingredient of writing-ink was, possibly, once part of the broken hoop of an old beer-barrel. The bones of

dead animals yield the chief constituents of lucifer-matches. The dregs of port-wine, carefully rejected by the port-wine drinker in decanting his favorite beverage, are taken by him in the morning in the form of Seidlitz powders, to remove the effects of his debauch. The offal of the streets and the washings of coal-gas re-appear carefully preserved in the lady's smelling-bottle, or are used to flavor blancmanges for her friends. This economy of the chemistry of art is only in imitation of what we observe in the chemistry of nature. Animals live and die; their dead bodies, passing into putridity, escape into the atmosphere, whence plants again mould them into forms of organic life; and these plants, actually consisting of a past generation, form our present food.—Dr. Lyon Playfair.

PERFUMES AS PREVENTIVES OF MOULDINESS.

Mouldiness is occasioned by the growth of minute vegetation. Ink, paste, leather, and seeds most frequently suffer by it. A clove will preserve ink; any essential oil answers equally well. Leather may be kept free from mould by the same substances. Thus, Russian leather, which is perfumed with the tar of birch, never becomes mouldy; indeed, it prevents it from occurring in other bodies. A few drops of any essential oil will keep books entirely free from it. For harness, oil of turpentine is recommended. Alum and resin are used to preserve bookbinders' paste, but ineffectually; oil of turpentine succeeds better; but, by small quantities of oil of peppermint, anise, or cassia, paste has been preserved for several years. Dr. Macculloch recommends the addition to the flour and water of some brown sugar, and a little corrosive sublimate; the sugar keeping it flexible when dry, and the sublimate preventing it from fermenting, and from being attacked by insects. A few drops of any of the essential oils may be added to the paste when it is made. It dries when exposed to the air, and may be used merely by wetting it. Seeds may also be preserved by the essential oils; and this is of great consequence when they are sent to a distance. Of course, moisture must be excluded as much as possible, as the oils or ottos prevent only the bad effects of mould.

OTTAR OF ROSES.

The rose-water of Kashmir is surprisingly fine; but there is nothing extraordinary in the way it is made. The *attar* is procured from trebly-distilled rose-water, which is boiled and poured into a

basin over night. Whilst the rose-water is still hot, the basin is placed two-thirds deep in a running stream, and in the morning the attar appears like oil on the surface of the water, and is carefully scraped off with a blade of grass bent in the shape of a Y. It is said that a small bottle of attar is the produce of 700 or 800 pounds of rose-leaves.—VIGNE'S *Travels*.

POMATUM.

The article now sold under this name, is very different from the original composition. This was called pomatum from its containing apples, *pomum*, Lat. Gerarde tells us: "There is made an ointment with the pulp of apples, and swine's grease, and rose-water, which is used to beautify the face and to take away the roughness of the skin, which is called in shops pomatum, of the apples whereof it is made." As the pomatum of the present day contains not a particle of apple, it is improper to apply the original name to perfumed grease.

PATCHOULY.

This popular perfume is obtained from an otto contained in the leaves and stems of an herb which grows extensively in India and China, and resembles our garden sage. Its odor is the most powerful of any derived from the botanic kingdom. In its pure state it has a kind of mossy or musty odor, analogous to Lycopodium, or as some say, it smells of "old coats." Chinese or Indian ink is scented by some admixture of Patchouly. Its introduction into Europe as a perfume was as follows;

A few years ago, real Indian shawls bore an extravagant price, and purchasers distinguished them by their odor; in fact they were perfumed with patchouly. The French manufacturers had for some time successfully imitated the Indian fabric, but could not impart the odor. At length they discovered the secret, and began to import the plant to perfume articles of their make, and thus palm off homespun shawls as real Indian! From this origin the perfumers have brought it into use. The leaves, powdered and put into muslin sacks, prevent clothes from being attacked by moths.—PIESSE'S *Art of Perfumery*.

PERMANENCE OF ODORS.

A fragment of musk not only gives off a strong smell when it is first exposed to the air, but it continues to do so for an almost indefinite period of time. Yet the odor must be caused by particles of

matter which are continually escaping from the musk, so long as it continues exposed to the air. How inconceivably small in weight, how infinitely minute in size, the molecules must be of which this constantly flowing stream of matter consists! Dr. Carpenter states in his "Comparative Physiology," that a grain of musk has been kept freely exposed to the air of a room, of which the door and windows were constantly open, for ten years; during all which time the air, though constantly changed, was completely impregnated with the odor of musk; and yet at the end of that time the particle was found not to have sensibly diminished in weight.—JOHNSTON'S *Chemistry of Common Life.*

CHEMICALLY PREPARED ESSENCES.

The Jury on perfumery at the London Exhibition of 1851, ascertained that some of the most delicious perfumes were made by chemical artifice, and not, as of old, by distilling them from flowers. The perfume of flowers often consists of oils and ethers, which the chemist can compound artificially in his laboratory. Commercial enterprise availed itself of this fact, and sent to the exhibition, in the form of essences, perfumes thus prepared. Singularly enough, they are generally derived from substances of intensely disgusting odor. A peculiarly fœtid oil, termed fusel oil, is formed in making brandy and whiskey. This fusel oil, distilled with sulphuric acid and acetate of potash, gives the oil of pears. The oil of apples is made from the same fusel oil, by distillation with sulphuric acid and bichromate of potash. The oil of pine-apple is obtained from a product of the action of putrid cheese on sugar, or by making a soap with butter, and distilling it with alcohol and sulphuric acid, and is now largely employed in England in the preparation of pine-apple ale. Oil of grapes and oil of cognac, used to impart the flavor of French Cognac to British brandy, are little else than fusel oil. The artificial oil of bitter almonds, now so largely employed in perfuming soap and for flavoring confectionery, is prepared by the action of nitric acid on the fœtid oils of gas tar. Many a fair forehead is damped with *eau de mille fleurs*, without knowing that its essential ingredient is derived from the drainage of cow-houses. Wintergreen oil is artificially made from willows, and a body procured in the distillation of wood. In the concentrated form the smell is rather acrid; but when diluted, the resemblance to the fruit is very marked. The best imitations are the pine-apple and the jargonelle pear; the green-gage, apricot, black currant and mulberry, when properly mixed, are fair imitations. They are quite innocuous

in the proportions used, namely, a drop and a half to the ounce: the cheap ices are flavored with these essences. Their introduction originated in the fact, that the peculiar flavor of "pine-apple rum" was due to butyric ether, which has since been obtained from the fruit itself.

MEALY AND WAXY POTATOES.

An examination of the potato with a microscope has, at length, proved the relative worth of the mealy and waxy kinds of this useful vegetable. On examining a thin slice, it is seen to be almost entirely composed of cells, which are sometimes filled with, and sometimes contain clusters of, beautiful little oval grains. These grains remain unchanged in cold water; but when it is warm they dissolve in it, and the whole becomes a jelly, and occupies a larger space than it did in the form of grains. When a potato is boiled, then each of these cells of which it is composed becomes a little vessel full of jelly; and, if there be not a great quantity of starch in the cells, it may be gelatinized without bursting them. But, if the number of grains or their size be very great, the cells of the potato are broken on all sides by the expansion of the little masses of jelly, and the appearance of mealiness is produced. Hence we see that mealy potatoes are the most valuable, and waxiness denotes a deficiency of starch or nourishing matter.

POTATOES IN BREAD.

It is well known that potatoes are often used by bakers in making bread, and a great popular clamor has been raised against the practice. It is to be observed, however, that when the use of them is confined within moderate limits there is neither fraud nor injury to the public. Mr. Donovan shows, that 5 stone of potatoes added to 4 cwt. of flour, and made into bread, will increase the weight only by about half-a-stone. In this case the potatoes are added to improve the bread; the small advantage by the increase of weight being scarcely enough to repay the additional trouble which the use of potatoes occasions. There are, however, bakers who use potatoes with another intention than that of improvement; as well as in much larger quantities than above specified. Bread of this kind will crack and crumble much, and have a dark streak, sometimes a little transparent, running along the margin of the under crust.

NOURISHMENT IN BREAD.

The superior nutritious qualities of bread have been doubted; but the question has been set at rest in France, by some chemical researches into the comparative nutriment of various edible substances. Messrs.

Percy and Vauquelin have ascertained that bread contains 80 nutritive parts in 100; meal, 84 in 100; French beans, 92; common beans, 89; peas, 93; lentils, 94; cabbages and turnips, the most aqueous of all the vegetables compared, produce only 8 pounds of solid matter in 100 pounds; carrots and spinach produce 14 in the same quantity; whilst 100 pounds of potatoes contain 25 pounds of dry substance. It must be recollected that the solid parts, when separated from the aqueous or moist parts, may contain a small quantity of extractive or ligneous matter, probably unfit for food; and next, that the same substances do not act uniformly on all stomachs, and are relatively more or less nutritious. But, as a general result, the scientific reporters estimate that one pound of good bread is equal to two pounds and a half or three pounds of good potatoes. The other substances bear the following proportions:—Four parts of cabbage to one of potatoes; three parts of turnips to one *idem;* two parts of carrots and spinach to one *idem;* and about three parts and a half of potatoes to one of rice, lentils, beans, French beans, and dry peas.

NOURISHMENT IN FOOD.

The wholesome or unwholesome character of any aliment depends, in a great measure, on the state of the digestive organs, in any given case. Sometimes, a particular kind of food is called wholesome because it produced a beneficial effect of a particular character on the system of an individual. In this case, however, it is to be considered as a medicine, and can be called wholesome only for those whose systems are in the same condition. Very often a simple aliment is made indigestible by artificial cookery. Aliments abounding in fat are unwholesome, because fat resists the operation of the gastric juice. The addition of too much spice makes many an innocent aliment injurious, because spices resist the action of the digestive organs, and produce an irritation of particular parts of the system.

In any given case, the digestive power of the individual is to be considered, in order to determine whether a particular aliment is wholesome or not. In general, we can only say, that aliment is healthy which is easily soluble, and is suited to the power of digestion of the individual; and, in order to render the aliment perfect, the nutritious parts must be mixed up with a certain quantity of innocent substance affording no nourishment, to fill the stomach; because there is no doubt that many persons injure their health by taking too much nutritious food. In this case, the nutritious parts, which cannot be dissolved, act precisely like food which is, in itself, indigestible.

It is a very mistaken idea that the nourishment in food is according to the quantity: a person may eat a great deal of some articles, and receive very little nourishment from them. The quantity of nourishment depends greatly on the aromatic flavor contained in food; and whatever is insipid to the taste is of little service to the stomach. Now, the difference between good cookery and bad cookery lies principally in the development of the flavor of our food; articles properly cooked yield the whole of it; by good cookery we make the most of every thing—by bad cookery, the least.

BREAD, NEW AND STALE.

New-baked bread possesses a peculiar softness and tenacity which is familiar to most people, and, though generally considered less digestible, is a favorite with many. After two or three days it loses its softness, becomes free and crumbly, and apparently drier. In common language, the bread becomes stale, or it is stale bread. It is generally supposed that this change arises from the bread becoming actually drier by the gradual loss of water; but this is not so. Stale bread contains almost exactly the same proportion of water as new bread after it has become completely cold. The change is merely in the internal arrangement of the molecules of the bread. A proof of this is, that if we put a stale loaf into a closely-covered tin, expose it for half an hour or an hour to a heat, not exceeding that of boiling water, and then remove the tin, and allow it to cool, the loaf, when taken out, will be restored in appearance and properties to the state of new bread. The quantity of water which well-baked wheaten bread contains, amounts on an average to about forty-five per cent. The bread, we eat, therefore, is nearly one half water.—Johnston's *Chemistry of Common Life.*

MAKING COFFEE.

Coffee, as very commonly prepared, by persons unacquainted with its nature, is a decoction, and is boiled for some time, under a mistaken notion that the strength is not extracted unless it be boiled. But the fact is just the reverse. The fine aromatic oil which produces the flavor and strength of the coffee, is dispelled and lost by boiling; and a mucilage is extracted at the same time, which also tends to make it flat and weak. The best modes are, to pour boiling water through the coffee in a biggin or strainer, which is found to extract nearly all the strength; or, to pour boiling water upon it, and set it on the fire, not to exceed ten minutes. The Turks and Arabs boil the coffee, it is

true, but they boil each cup by itself, and only for a moment, so that the effect is, in fact, much the same as that of infusion, and not like that of decoction. They do not separate the coffee itself from the infusion, but leave the whole in the cup.

BOILING EGGS.

The nourishment contained in eggs has never yet been questioned; but few persons are aware how eggs lose this property in cooking. "The yolk of eggs," says Dr. Hunter, "either eaten raw or *slightly* boiled, is, perhaps, the most salutary of all animal substances. It is taken up into the body of the chick, and is the first food presented to it by Nature after its departure from the shell. It is a natural soup, and in all jaundice cases no food is equal to it. When the gall is either too weak, or, by any accidental means, is not permitted to flow in sufficient quantity into the duodenum, our food, which consists of watery and oily parts, cannot form a union so as to become that soft and balsamic fluid called chyle. Such is the nature of the yolk of an egg, that it is capable of uniting water and oil into a uniform substance, thereby making up for the deficiency of natural bile. When submitted to a long continuance of culinary heat, the nature of the egg is totally changed; so that, when eggs are medicinally used, they should be eaten raw, or but very slightly boiled."

YEAST.

The yeast with which we raise our bread is a minute plant belonging to the division of the Confervæ. In the heat of the fermentation of the juice of ripe grapes the plants are produced by millions, a single cubic inch of such yeast, free from adhering water, containing eleven hundred and fifty-two millions of the minute organisms. The cells or globules vary in size from $\frac{1}{75000}$ to $\frac{1}{25000}$ of an English inch.—JOHNSTON'S *Chemistry of Common Life.*

ROAST AND BOILED MEATS.

Contradictory statements are made of the relative nourishment in roast and boiled meats; which may be reconciled as follows: In meat, both albumen and gelatine exist; and as the latter is soluble in warm water, hence the difference in the nutritious quality of butcher's meat, according to the mode of cooking it. When, for instance, meat is boiled, the greater part of the gelatine is extracted and retained by the soup; when, on the contrary, it is roasted, the gelatinous matter is not

removed; so that roasted meat contains both gelatine and albumen, and should, therefore, be more nutritious than boiled.

IMPURE WATER.

It is a mistake to suppose that water, because it contains animalcules or confervæ, is necessarily unwholesome. However repugnant to our feelings it may be to use water containing these foreign bodies, it is only when they are dead and putrid that danger arises from their presence.—DR. DAUBENY.

RELATIVE PURITY OF WATERS.

Generally speaking, rain water which falls in remote country districts is the purest; then comes river water; next, the water of lakes; after these, common spring waters; and then the water of mineral springs. The waters of the Black Sea and the Sea of Azof, which are only brackish, follow next; then those of the great ocean; then those of the Mediterranean and inland seas; and last of all come those of lakes, which, like the Caspian Sea, the Dead Sea, and Lake Aral, possess no known outlet. The waters of the great ocean and its branches contain from 2,200 to 2,800 grains of saline matter in the gallon; those of the Dead Sea, in some places, 11,600; in others as much as 21,000 grains, or one-fourth part of their whole weight. Those of a small lake east of the steppes of the Wolga contain as much as three-fifths of their weight of saline matter.—JOHNSTON'S *Chemistry of Common Life.*

COFFEE A DISINFECTANT.

Coffee is a powerful deodoriser: it has instantly destroyed the smell of putrefying meat; and in half a minute it has permanently cleared a house of the effluvium of a cesspool. To use coffee for these disinfecting purposes, dry the raw bean, pound it in a mortar, and roast the powder on a moderately heated iron plate until it is of a dark brown tint; then sprinkle it in sinks or cesspools, or lay it on a plate in the room which you wish to have purified. Coffee-acid or coffee-oil acts more readily in minute quantities.

NUTRIMENT IN COFFEE.

M. Payen shows that coffee, *slightly roasted*, contains the maximum of aroma, weight, and nutrition. He declares coffee to be very nutritious, as it contains a large quantity of azote; three times as much nutriment as tea, and more than twice the nourishment of soup

(*bouillon*). Chicory contains only half the nutriment of coffee. M. Payen has also obtained from coffee a crystalline extract capable of giving a deep green color to five thousand times its weight of water or spirit.

DANGER FROM COPPER COOKING UTENSILS.

The precise danger from the use of copper cooking utensils imperfectly tinned is far from being generally understood. It appears that the acid contained in stews, as lemon-juice, though it does not dissolve copper by being merely boiled in it a few minutes, nevertheless, if allowed to cool and stand in it for some time, will acquire a sensible impregnation of poisonous matter, as verdigris, or the green band which lines the interior of the vessel. Dr. Falconer has observed that syrup of lemons boiled fifteen minutes in copper or brass pans did not acquire a sensible impregnation; but if it was allowed to cool and remain in the pans for twenty-four hours, the impregnation was perceptible even to the taste, and was discovered by the test of metallic iron. This fact has been further confirmed by the researches of Prout, who states, that in preparing food or preserves in copper, it is not till the fluid ceases to cover the metal, and is reduced in temperature, that the solution of the metal begins. Unctuous or greasy solutions are most liable to become impregnated with poisonous verdigris if left long in untinned brass or copper vessels. Sir Humphrey Davy asserts that *weak* solutions of common salt, such as are daily made by adding a little salt to boiling vegetables and other eatables in our kitchens, act powerfully on copper vessels, although *strong* ones do not affect them.

SPURIOUS SODA WATER.

Most of the beverage sold as Soda Water is improperly named; it should rather be called effervescing water, for it has not a particle of soda in it: it is merely water with carbonic acid forced into it by using mechanical pressure, as that of a condensing syringe or a powerful force-pump. The water by this treatment will effervesce violently when poured out; have a brisk, agreeable, acerb taste; and, although in other respects an acid, is not sour. If a little soda has been dissolved in the water previously to its impregnation, the result would be pure soda water.

SHERRY.

The wines of Xeres consist of two kinds, sweet and dry, each of which is subdivided into two other varieties. Amontillado belongs

to the latter class, the other description produced from the dry wine being sherry, properly so called, that which passes generally by that name. These two wines, though differing from each other in the peculiarities of color, smell, and flavor, are produced from the same grape and in precisely a similar manner; indeed it frequently happens that of two or more *botas* filled with the same sweet wine, and subjected to the same manipulation, the one becomes amontillado and the other natural sherry. This change takes place ordinarily during the first year, but sometimes during the second, but its cause and nature are quite unexplained. Natural sherry has a peculiar aromatic flavor, somewhat richer than amontillado, and partakes of three different colors, pale, or straw, golden, and deep golden, the latter being the description usually denominated by us brown sherry. Amontillado is a straw-color only, more or less shaded according to its age. Its flavor is drier and more delicate than that of natural sherry. It is less abundant than the other, and is age for age dearer. It derives its name from Montilla in Upper Andalusia. The two sweet wines of Xeres are the "Paxarite" or "Pedro Ximenes," and the "Muscatel." The first named is made from a species of grape called Pedro Ximenes, sweeter in quality than that which produces the dry sherry, and which is exposed much longer to the sun previous to manufacture, its condition when pressed resembling very much that of a raisin. Fermentation is consequently much more rapid. Muscate wine is produced from the grape of that name and is still sweeter than the Pedro Ximenes; its color is also deeper, but the color of both, like that of the two dry wines, increases in proportion to their age, a circumstance exactly the reverse of what takes place in French wines. A greater or less amount of boiled wine added to the other is also said to affect the color. Sherry, in a commercial point of view, dates only from 1720. In the neighborhood of Xeres there are now under cultivation from 10,000 to 12,000 *arpents* of vines, which produce annually 70,000 to 75,000 hogsheads of wine, or did before the recent attacks of the vine-disease. The ripest grapes are selected for the best wines. The wines of Xeres, like all those of Spain, require the addition of the necessary body for exportation, and prior to shipment (none being sold under four to five years of age,) between a fiftieth and sixtieth of brandy is added. San Lucas, Porto, Santa Maria and Malaga, produce inferior and spurious varieties of sherry.

COLOR OF WINE.

It is an erroneous idea to suppose that *white* wine is exclusively the produce of white grapes. Fermentation alone determines the

color. The juice contained in both the *red* and the *white* grape is nearly as colorless as water; except in one peculiar species, which is called the dyer, "*raisin teinturier*," the liquor of which is of a purple hue. If the juice of the grapes which have been gently pressed by the feet of men in the tub of the vineyard, is drawn off, and allowed to ferment without the skin, the seeds, and the stalks, which contain the coloring elements, the wine will certainly be *white*. On the contrary, if the liquor is left to ferment with them, the wine must be red.

White champagne is made, for instance, from a grape so deep in color, as to appear actually black; and sherry is indiscriminately made from colored and colorless grapes, although a white wine. Red and white port are produced from the same grape, the former with, and the latter without the husk being allowed to remain in the must during its fermentation. The red coloring matter in the husk is of an astringent nature; and it communicates the same quality to the wine, as well as a slight roughness. The husk is, however, capable of communicating but a light red color: when the red is deep, it is the effect of artificial color imparted; and a deep red color is never a desirable quality.

DECANTING MADEIRA AND CLARET.

A frequent error is that of decanting Madeira wine and leaving the stopper out; it is a barbarous system and cannot be sufficiently reprobated. The fine nutty flavor so much prized by the gastronomic planters, the indescribable aroma, the nosegay in short, is destroyed by this senseless process; your pseudo judge says it renders the wine soft and silky, for which read *flat and vapid*. Above all, never put your Madeira into a decanter—it is little short of sacrilege. Keep it in the black bottle, and never take the cork out but to replenish your glass.

The error just pointed out as regards Madeira applies also to Claret; for some unthinking persons will pour it into glass jugs, if not decanters. By this means, the delicate and fragrant bouquet is destroyed. Never be guilty of such injustice to this truly delicious wine; there is never any crust or deposit in good Claret, and you may safely pass the bottle, but with this special obervance, never leave it uncorked.

FROTHING CHAMPAGNE.

The manufacturers of Champagne, to preserve its sweetness, and promote effervescence, commonly add to each bottle a portion of

syrup, composed of sugar-candy and cream of tartar; the highly frothing kinds receiving the largest quantity. Therefore, contrary to the prevailing opinion, when "the wine sparkleth in the glass, and moveth itself aright," it is most to be avoided, unless the attributes of age should countervail all its noxious properties.

The prevalent notion that a glass of champagne cannot be too quickly swallowed, is erroneous; and it is no bad test of the quality of champagne, to have it exposed, for some hours, in a wine-glass, when, if originally of the highest order, it will be found to have lost its carbonic acid, but entirely to retain its body and flavor, which had before been concealed by its effervescence. Champagne should, therefore, not be drunk till this active effervescence is over, by those who would relish the above characteristic qualities.

Still champagne is often mistaken by its qualities: it is a strong heating wine, though commonly thought to be weak and cooling.

The idea that champagne is apt to occasion gout seems to be contradicted by the infrequency of that disorder in the province where it is made.—Dr. Henderson, and Prof. Brande.

GAS IN DWELLING HOUSES.—ITS USES, CONVENIENCES, AND ECONOMY.

Gas is superior to every other material as a light-giving agent, not only on account of the brilliancy of its effects, and its cheapness, but because it is safer, enonomizes time and labor, and is more easily managed. Always in their places, the lighting and putting out of gas lights is the work only of an instant. No sparks or impurities are blown or otherwise scattered about; and, consequently, there is no risk of damaging, or setting fire to clothes or furniture, as so often happens with lamps and candles. The time usually occupied in cleaning candlesticks and trimming lamps is no trifling matter; to say nothing of the dirt, the disagreeable odors, and the waste consequent thereon.

The management of gas is perfectly simple and easy. All that is really necessary to be known about turning it on, and adjusting the supply, and turning it off, to ensure perfect safety, might be acquired, by practice, in a few minutes. The most ordinary degree of care and observation are sufficient to guard against an escapement of gas. When that happens, whether by mistake, neglect, or defect in the pipes or fittings, it is easily remedied. The odor of gas is so unlike every other, constituting one of its most valuable properties, that it

can thereby be instantly detected, traced to its source, and immediately prevented. Let it not be supposed that the odor of gas in a house is a common occurrence. Such a case is exceptive, and is as unnecessary as that drains, or sewers, or cesspools, should be choked, or overflowing, or left uncovered. When an escape of gas is suspected or known to exist, open the door and window of the room, and search for it immediately—but not with a lighted candle, and the cause will soon be discovered.

It must be conceded that in a house well lighted with gas, there are comforts and means of enjoyment which are unknown where, from necessity or preference, candles or lamps are still in use. The advantages of a good light in all parts of a house, from the cellar to the attics, as contrasted with an indifferent or a positively bad one, are not likely to be denied. By a *good* light is intended just so much as is necessary—a moderate, but not an excessive quantity—sufficient for all practical purposes, but no waste. In lighting private apartments this is a condition of the utmost importance. In shops and other places of business, where doors are constantly open, and there are other means of ventilation, it is not so. There a great quantity of light is necessary, and, as frequently happens, the number and arrangement of the gas-burners are intended to attract attention even more than the goods displayed for sale. In the quietness of the family this must be avoided. For special purposes, it may be desirable to have the means of brilliantly lighting up particular apartments; but on ordinary occasions, gas should be used solely with reference to comfort and utility.

It is sometimes said that gas is injurious to the eyes. During twenty years of careful observation and inquiry, no instance of the kind has ever come to my knowledge. A powerful light imprudently used, or improperly directed, might be expected to be hurtful; but in that case light from oil, tallow, wax, or turpentine, would be equally objectionable as that from gas. To say that a good light, in the sense in which the term is here employed, is injurious, and that an indifferent or bad one is not so, is about as reasonable as to affirm that the light of the moon is more useful than that of the sun, or that it is easier and more congenial to the feelings to read, or write, or work by fire-light, than by that from candles.

The eyes are more distressed, and sight more impaired, by a few days of over-straining in the dimness of candle light, than by years of closer application in the light from a properly regulated gas-burner. A good gas light, producing as nearly as possible the same effects as diffused sun light, placed at a proper distance from, and above, the

eyes, is not injurious; but, on the contrary, exceedingly agreeable and eminently preservative. The direction in which artificial light falls upon the eyes has not received sufficient attention. Table lamps and candles are, in most instances, too low; that is, the light is too near the plane of the axis of the eye to be comfortable, or to produce the best illuminating effects. The natural, and, therefore, the most appropriate position for the light, is at a convenient distance above the eye; the angular direction being, of course, dependent on the height and dimensions of the room. In this respect, gas has an advantage over other modes of lighting; the situation as well as the quantity of the light, being determinable with the greatest accuracy.

An uncomfortable degree of heat is sometimes complained of as one of the results of lighting a room with gas. By a little forethought, and a few simple contrivances, this might be prevented. Let it be remembered that the quantity of heat emitted by lamps, candles, and gas-lights is, in practice, very nearly in proportion to the quantity of light obtained. It matters not, therefore, what means are employed or materials used in procuring light; for, if a certain quantity be considered necessary, and there be more at one time than another, or by using gas instead of candles the quantity be permanently increased, the heat diffused throughout the apartment must necessarily be increased in the same proportion.

It must also be understood, that the products of combustion are precisely the same in their chemical constitution, whether the light-giving material be wax, tallow, oil, or gas. If gas be well purified, it not only yields a more brilliant light from a flame of the same dimensions, but its combustion is more perfect than that of lamps and candles. In using the latter, there is a preparatory process of vaporization—a necessary part of the light-giving operation. In burning gas this is dispensed with, and many unpleasant odors are thereby avoided.

How happens it that a room once considered so comfortable when lighted by candles, should all at once become oppressively warm when lighted by gas? This is a question not very difficult to answer. It is an every-day occurrence. In the room referred to on ordinary occasions, there had probably been two candles used. On special occasions the number might have been increased to four. Gas light is introduced. The usual habits of prudence and economy in the use and management of light seem to be entirely forgotten. Gas being much cheaper than candles, the light more agreeable, and the quantity so easily increased, all the thoughts are absorbed in lighting the room

effectively. If only one gas-burner be used—and that perhaps may not be the proper form and size adapted to the room—it is likely that in the first experiences of a good light, the quantity may be equal to that from eight, or ten, or even twelve candles. If two burners instead of one be used, even supposing them to be appropriate, and of a smaller size, it is not likely that there will be less light than from eight or ten candles.

In the case here described, is it wonderful that the room should be uncomfortably warm? What is to be done? Be more economical of light. Obtain the advice of those whose knowledge and experience may be relied on, and, following their directions, use suitable burners and glasses, admit a continuous supply of fresh air to the room, and adopt some of the simplest and cheapest methods of ventilation. All will then go on well. Every room and passage in a house might be properly, that is, effectively lighted; and there need be no waste of gas, no excess of light, no uncomfortable degree of heat, and what is likely to be of equal importance, no cause of complaint about expense. These conditions imply good management; by which is meant just the same amount of care and watchfulness as are usually exercised over other domestic arrangements.

There is no reason why gas should be wasted, or used extravagantly, any more than that the most ordinary articles of food, or clothing, or fuel, should be thrown away or misapplied. This is a part of domestic management in which servants require to be well instructed. Until it is explained to them, it is difficult for some persons to understand how that which can be seen only by its illuminating effects can so easily be lost, or improperly used, or wilfully wasted. A few lessons on this subject will be very useful. Masters and mistresses will increase their own knowledge, by thus endeavoring to impart a little of that which ought to be possessed by other members of their household.

When it is said the cost of gas is equal only to one-seventh of that of (mould) candles, be it remembered the comparative cost of the materials has reference to equal quantities of light from each. To suppose that the light in a room hitherto supplied by two candles, and afterwards by gas equal to twelve candles, would cost less in the latter case than in the former, would be a very great mistake. Experience soon corrects these errors; but it sometimes brings with it a feeling of disappointment, if not of dissatisfaction. The low price at which gas is sold, leaves a wide margin for practising economy. It is impossible for any one, in the transition from candles to gas, to be satisfied

with the same quantity of light they had formerly used. This is a practical result; and so long as the excess is kept within reasonable limits, every statement here made about the cheapness of gas, in comparison with candles and lamps, will be fully verified.

There is no burner better adapted for private houses than the union-jet, commonly called the fish-tail. It is made of various sizes, and is cheap and durable. The smallest sizes answer the purpose of single-jet burners for bed-rooms and passages; whilst the larger are so easily adjusted as circumstances require, that the combustion of the gas is perfect when the quantity of light is small.

In choosing fittings no special directions are necessary. So great is the variety, and so easy is it to obtain whatever is suitable, both in price and appearance, that every one's wants can be supplied. As a matter of taste, it is desirable to think of the height and area of the rooms, the color of the walls, the style of the furniture, and the uses to which the rooms are applied. Light and elegant fittings, tasteful in design and beautifully got up as respects workmanship, have taken the place of the unmeaning masses of metal which formerly disfigured, and assisted in over-heating, the best rooms in a house. This is an important change, and in the right direction; due, in a great measure, to the cheapness of gas, and the increased demand consequent thereon. The cost of fittings was formerly an obstacle to the use of gas. There is no longer any cause for complaint in this department. Cheapness, usefulness, durability, and embellishment, are easily found so to harmonize that the pocket need take no exception to what is most approved by the eye.

It deserves notice that the use of ground (roughed) glasses is attended by loss of light, and, as a consequence, more gas is required, and, therefore, an additional quantity of heat produced. Under the most favorable conditions, at least one-fourth of the light is absorbed; and when the glasses lose their color a still greater quantity, varying from a third to one-half. Every thing need not be given up to utility, nor must too much be yielded to appearances. A middle course is the easiest and the wisest. All kinds of gas glasses, especially those used with fish-tail burners, might be made sufficiently ornamental, if the lower parts were left perfectly bright. The light would, in that case, be most abundantly diffused, exactly where it is most needed; whilst comfort and economy would be easily and pleasantly combined.

Ventilation is a subject much too difficult to be discussed in a few pages. Some general directions are all that can be promised, and it is hoped they will prove sufficient.

Taking any number of houses in a given locality, it is not to be denied that those well lighted with gas are more easily and efficiently ventilated than the others. Spontaneous ventilation, that which most closely imitates natural processes, is greatly promoted, and indeed is always in operation, in a house whose walls, and ceilings, and furniture are dry and warm. In such circumstances it is impossible that air can remain at rest. A constant interchange is effected; fresh air forcing itself in, and having its temperature raised; when, making its escape, it gives place to a further supply at a lower temperature.

The process just described might be greatly assisted by the admission, by day and night, and at all seasons, of a certain quantity of cold air into the principal passages of a house. An opening in a door or window, properly protected from weather, and on the most sheltered side of the house, is all that is required. Partition walls, and others which are battened, usually supply a means of indirect communication, between floors and ceilings, with the roof of the house. No better system of ventilation can be adopted than to admit a properly regulated quantity of air, in this way, to particular rooms where it is most needed. Taking the air from the top of the house, that is, from the roof, instead of the bottom (the kitchen and other domestic offices), it is always cool and wholesome. In many instances, advantage might be taken of a picture, or a looking-glass, or a book-case to conceal an opening in the plastering, the nearer the ceiling the better, say ten or twelve inches square, for the ingress of air. This should be covered with perforated zinc, to keep out insects, and fitted up with a sliding-door adjustable at pleasure.

In devising plans for ventilating, many persons are greatly troubled about getting rid of the heated air, and they are disappointed because it will not make its escape at any opening they may choose for it. It is easier to begin by admitting a continuous supply of cool pure air; just so much of it, according to season, and temperature, and other circumstances, as shall be agreeable, and yet its presence should not be indicated by creating a draft. If this be well looked after, there need be no anxiety about what becomes of the vitiated air. That must be displaced by the entrance of fresh air. Both kinds cannot occupy the same place at the same time. This is ventilation on the truest principles, and without risk of having the head almost blown off, or the feet frozen.

The gasometer is now so generally used that any description of it is here unnecessary. As an accurate and disinterested measurer, between buyer and seller, it has no equal in commercial transactions.

Its construction and mode of operation, the working of the index, and its means of recording the quantity of gas which passes through the machine, are easily explained and quickly understood, by those who wish to possess the necessary information.

In estimating the relative cost of gas light, as compared with the light from tallow, wax, and oil, it has been already stated, that equal quantities of light from each material form the basis of such calculations.

In comparison with the cheapest kind of lamp oil, the cost of light from gas will be less than one-fifth, and compared with sperm oil only one-ninth. Gas is admirably adapted, and is coming extensively into use, for warming, ventilating, and cooking; and for many other purposes both domestic and commercial. Cooking by gas is easily understood, and is very cleanly and convenient. In many other respects it possesses advantages so peculiarly its own, that it needs only to be fairly tried to realize all that can be said in its favor. Roasting by gas is the perfection of that part of the culinary art. The meat thus prepared, both in flavor and nutritive properties, is superior to that cooked by an open fire; and this is as applicable to the smallest, as it is to the largest joints. In baking cakes, or pastry, the requisite knowledge is acquired in a few hours; the heat being regulated with such accuracy as always to ensure success. In warming by gas it is desirable that the stove should communicate with a flue or chimney; but always in such a manner as that, whilst the products of combustion escape, as much as possible of the heat may be retained in the apartment.

HOW TO BURN COAL.

Nine out of ten who attempt to burn coal in a stove, waste about as much coal as is necessary to be consumed for the obtaining of all the heat desirable. The following rules for the inexperienced, are worthy of note:—

First, To make a coal fire. Put in a double handful of shavings, or use light kindling-wood instead. Fill the earthen cavity (if the stove has one) nearly full of chunks of dry wood, say four to six inches in length. On the top put a dozen lumps of egg coal. Light with a paper from beneath. In ten minutes add about twenty lumps more of coal. As soon as the wood has burnt out, fill the cavity half to two-thirds of coal. The fire will be a good one. The coal will, by these directions, become thoroughly ignited.

Second, Never fill a stove more than half or two-thirds full of coal, even in the coldest weather.

Third, When the fire is low, never shake the grate or disturb the ashes, but add from ten to fifteen small lumps of coal, and set the draught open. When these are heated through and somewhat ignited, add the amount necessary for a new fire, but do not disturb the ashes yet. Let the draught be open half an hour. Now shake out the ashes. The coal will be thoroughly ignited, and will keep the stove at high heat from six to twelve hours, according to the coldness of the weather.

Fourth, for very cold weather. After the fire is made, according to rule first and third, add every hour about fifteen to twenty lumps of egg coal. You will find that the ashes made each hour will be about in that ratio.

SMOKE FROM GAS-LIGHTS.

It is pretty generally imagined that the smoking of ceilings is occasioned by impurity in the gas, whereas, in this case, there is no connection between the deposition of soot and the quality of the gas. The evil arises either from the flame being raised so high that some of its forked points give out smoke, or more frequently from a careless mode of lighting. If, when lighting the lamps, the stop-cock be opened suddenly, and a burst of gas be permitted to escape *before* the match be applied to light it, then a strong puff follows the lighting of each burner, and a cloud of black smoke rises to the ceiling. This, in many houses and shops, is repeated daily, and the inevitable consequence is a blackened ceiling. In some well-regulated houses, the glasses are taken off and wiped every day, and before they are put on again, the match is applied to the lip of the burner, and the stopcock cautiously opened, so that no more gas escapes than is sufficient to make a ring of blue flame; the glasses being then put on quite straight, the stopcocks are gently turned, until the flames stand at three inches high. When this is done, few chimney-glasses will be broken, and the ceilings will not be blackened for years.—Sir John Robison.

KEEPING TEA.

It is alleged that Tea is injured by being kept too long in England; but this assertion is disproved by experience and facts: for it is well known that good black tea is kept in China, like wine, and improved by age; and the London brokers maintain, that common black teas

are decidedly improved by keeping, in a proper place, even if for only two years; that even the common sorts of teas are better liked by the public, when kept, than they would be if fresh; they used not to be, but they are now. Common green tea is not much altered; but black tea gets stronger, and common bohea, if kept for more than two years, will sell for a higher price than if fresh. Neither the Chinese nor natives of Japan ever use tea before it has been kept at least a year; because, when fresh, it is said to prove narcotic, and to disorder the drinker.

EMBALMING IN EGYPT.

There were three different ways of embalming. The most magnificent was bestowed only upon persons of distinguished rank, and the expense amounted to a talent of silver, about £137 10*s*. (Calmet says, about £300) sterling; but twenty minæ, or sixty pounds, was considered moderate; and the lowest price was very small. When a person of distinction died, the body was put into a coffin; the upper exterior of which represented the deceased, with suitable embellishment. The coffin itself was usually made of sycamore wood, which, according to Dumont, is almost incorruptible: sometimes deal was used, in which case it was brought from abroad. The embalming of the body occupied from forty to seventy days. It consisted mainly of the introduction of astringent drugs and spices into the body, anointing it with oils of cedar, myrrh, and cinnamon, and saturating it with nitre. It was then washed, and wrapped in linen bands dipped in myrrh and gum,—these bands in some instances being one thousand yards long, —commencing at the head, and terminating at the feet, avoiding the face. The body was then restored by the embalmers to the relations, who placed it in the coffin. A less expensive process of embalming was simply to inject into the bowels a liquid extract of cedar, and wrapping up the body in salt or nitre; others were soaked, or, as some think, boiled in a kind of bitumen made of mixed resinous substances. They were then placed, without any other covering than the bandages saturated with this substance, in sepulchres, and there deposited in rows by thousands.

GERMAN SILVER.

German Silver derives its name from the fact, that its first introduction in the arts, to any great extent, was made in Germany. It is, however, nothing more than the white copper long known in China. It does not contain a single particle of real silver; for it is only an alloy of copper, nickel, and zinc.

SPURIOUS GILDING.

Much of this work is executed without a particle of gold, but it speedily becomes tarnished and discolored. The cheap gilding of picture and looking-glass frames is thus executed, and consequently, is liable to these defects; wherefore it is false economy to employ any but gold leaf. The common "gilding" metal is copper beaten out into very thin plates, and afterwards rendered yellow like gold, by exposing them to the fumes of zinc, without any real mixture of it in the metal.

COMPOSITION OF GLASS.

Glass has usually been considered to be a strictly chemical combination of its ingredients, and a very perfect artificial compound. Such, however, is not the case, the alkali in common glass being in a very imperfect state of combination. Thus Mr. Griffiths has shown that if either flint-glass or plate-glass be finely pulverized in an agate mortar, then placed upon turmeric paper, and moistened with pure water, strong indications of free alkali will be obtained. Mr. Farraday considers glass rather as a solution of different substances one in another than as a strong chemical compound; and it owes its power of resisting (chemical) agents generally to its perfectly compact state, and the existence of an insoluble and unchangeable film of silica or highly silicated matter upon its surface.—*Bakerian Lecture*, *Philos. Trans.* 1830.

ACONITE

Was regarded by the ancients as the most violent of all poisons: hence they fabled it to be the invention of Hecate, and sprung from the foam of Cerberus. Persons, only by smelling the full-blown flower, are said to have been seized with swooning-fits, and to have lost their sight for two or three days; and a criminal has been put to death by swallowing a dram of the aconite-root.

Many fatal cases of poisoning have occurred by the accidental substitution of Aconite Root, or Monkshood (*Aconitum napellus*), for Horse-radish; but the roots of the two plants, instead of resembling each other, have scarcely any appearance in common. The only resemblance is in the crowns: thus Monkshood is conical in form, and tapers imperceptibly to a point; whilst Horse-radish is slightly conical at the crown, then cylindrical, or nearly so, and almost the same thickness for many inches. Monkshood is coffee-colored externally; Horse-radish is white, with a yellow tinge. Moonkshood is named from the resemblance of its flower to the hood of a monk.

POISON OF NICOTINE.

Smokers, by inhaling the fumes of tobacco, introduce into their system a certain quantity (though small) of poisonous matter, or Nicotine. When pure, its acrid smell slightly resembles that of tobacco; but when volatilized by heat, it throws out vapors which are so oppressive, that breathing becomes difficult in a room where a drop of the liquid has been spilled. M. Orfila killed many dogs by applying five drops of nicotine on their tongues; with twelve drops death ensued in twelve minutes. Two drops applied to the tongue of a cock caused death almost instantaneously. Nicotine can be detected as easily as mineral poisons; and when Gustave Foignies was poisoned by the Count Bocarmé, a few years since in Belgium, with nicotine, it was detected by M. Stas in the flooring of the dining-room wherein Gustave died, although that flooring had been washed with soap, oil, and warm water.

ON THE PREVENTION OF THE OXIDATION OF METALS.

Those familiar with the electrical science are well acquainted with the fact that zinc exercises positive relations with regard to most other metals. In other words, it possesses the power of keeping them in a negative state when in contact with them. In this negative state they are incapable of entering into combination with oxygen, and this circumstance may be applied with much advantage to the prevention of the oxidation of machinery, especially such parts of it as, in the case of marine engines, are liable to come in contact with water. Many instances will at once suggest themselves, in which much manual labor might be saved by the simple contrivance of appending either a ring or a slip of zinc to the metal to be preserved bright. It would be especially applicable in the case of bayonets and rifle barrels; and a zinc edging to a scabbard would prevent rusting of the sword.

SALTNESS OF THE SEA.

The sea is supposed to have acquired its saline principle when the globe was in the act of subsiding from a gaseous state. The density of sea water depends upon the quantity of saline matter it contains: the proportion is generally about three or four per cent., though it varies in different places; the ocean contains more salt in the southern than in the northern hemisphere, the Atlantic more than the Pacific. The greatest proportion of salt in the Pacific is in the parallels of 22° N. lat. and 17° S. lat.: near the equator it is less; and in the Polar Seas it is least, from the melting of the ice. The saltness varies with the

seasons in these regions, and the fresh water, being lighter, is uppermost. Rain makes the surface of the sea fresher than the interior parts, and the influx of rivers renders the ocean less salt at their estuaries: the Atlantic is brackish 300 miles from the mouth of the Amazon. Deep seas are more saline than those that are shallow, and inland seas communicating with the main are less salt, from the rivers that flow into them: to this, however, the Mediterranean is an exception, occasioned by the great evaporation and the influx of salt currents from the Black Sea and the Atlantic. The water in the Straits of Gibraltar, at the depth of 670 fathoms, is four times as salt as that at the surface. Fresh water freezes at the temperature of 32° of Fahrenheit; the point of congelation of salt water is lower. As the specific gravity of the water of the Greenland Sea is about 1.02664, it does not freeze till its temperature is reduced to 28½° of Fahrenheit; so that the saline principle preserves the sea in a liquid state to a much higher latitude than if it had been fresh, while it is better suited for navigation by its greater buoyancy. The healthfulness of the sea is ascribed to the mixing of the water by tides and currents, which prevents the accumulation of putrescent matter.—SOMERVILLE's *Physical Geography.*

SALT IN THE OCEAN.

The amount of common salt in all the oceans is estimated by Schafhäutl at 3,051,342 cubic geographical miles. This would be about five times more than the mass of the Alps, and only one-third less than that of the Himalayas. The sulphate of soda equals 633,644.36 cubic miles, or is equal to the mass of the Alps; the chloride of magnesium 441,811.80 cubic miles; the lime salts 109,339.44 cubic miles. The above supposes the mean depth to be but 975 feet, as estimated by Humboldt. Admitting with Laplace, that the mean depth is 3,250 feet, which is more probable, the mass of marine salt will be more than double the mass of the Himalayas.—SILLIMAN's *Journal. No.* 16.

TO ASCERTAIN WHEN A NEW BUILDING IS DRY ENOUGH TO BE INHABITED.

The administration of jails at Geneva, after a careful examination of the subject, have established the following rules:—

1. In the newly erected building, sundry rooms, apparently the most dry, and sundry others, apparently the most humid, are to be selected.

2. In the neighborhood of the new house, several rooms are selected, which have been inhabited already a considerable time, so that

the sanitary condition of the latter can be ascertained; after that, of their inhabitants. In this selection care must be taken that among the inhabited rooms in which the experiments are to be made, there be both those which are well ventilated, dry, and healthy, as well as so badly ventilated, and so damp, that the effects thereof be apparent on the inhabitants.

3. Twenty or more rooms in the new house and in the neighborhood being thus selected, an equal quantity of vessels of precisely the same capacity, form, and opening, are filled either with fresh-burned quicklime, coming from the same kiln and finely pulverized, or with sulphuric acid of commerce; five hundred grains is about the right charge for a vessel, either for lime or for the acid; but it is necessary, in either case, that the charges be weighed with the most exact balance.

4. The vessels thus filled have to be placed in all the selected rooms. Trustworthy persons have to care that said vessels be placed in the midst of the rooms, and that windows, chimneys, and doors, be carefully closed as soon as the vessels are thus placed. In rooms to be furnished with bedsteads close to the walls, the above vessels are to be placed close to such walls.

5. Twenty-four hours after the exact moment of the location of the first vessels, the removal of all the vessels is to take place in the very order of the location, and all of them are to be transferred into a room where each in its turn is to be weighed. This is to obtain the exact weight of each, twenty-four hours after its location. The weights at the moment of location, and those twenty-four hours after, are carefully recorded for each vessel, each of them being marked with a separate number corresponding with the number of the room in which it was located.

If the numbers recorded by this process be then examined, it will be found that the weight has increased; and if then the amount of the increase in the rooms of the house newly built, be compared with the amount of the increase in the several rooms of the neighborhood, due consideration taken of the sanitary condition of the latter, such comparison will indicate at once and with infallible security, whether any part of the new building, and which part, is dry enough to be used as a dwelling without danger to the inhabitants.

SPONTANEOUS HUMAN COMBUSTION.

Bischoff and Liebig, employed as experts in the recent celebrated case of the Countess of Gorlitz, not only declared that her case pre-

sented an example of "post mortem" burning, (which proved to be true), but took the occasion absolutely to deny the trustworthiness of any of the cases of spontaneous human combustion on record. The conclusions they arrived at, are substantially the same as those maintained by Liebig in his *Familiar Letters upon Chemistry*, viz: 1. That of the cases adduced, none is well authenticated; while in most it is admitted that the victims were drunkards, and that generally a candle or lamp was in the room, and after the alleged combustion was found turned over. 2. That spontaneous combustion was absolutely impossible, the human frame containing 75 or 80 per cent. of water; and since flesh, when saturated with alcohol, is not consumed upon the application of a light, the alcohol burning off first, the causes assigned to account for the spontaneous ignition are *à priori* extremely improbable.

These positions M. Devergie combats, founding his argument upon the consideration of a case which occurred within his own knowledge, and of the various accounts of other examples that have been recorded by trustworthy persons. Although the term "spontaneous" is not strictly a correct one, inasmuch as there has always been an immediate cause of the combustion, he retains it for want of a better; and he considers the leading characteristic of these cases to be the absence of harmony between the mass of the parts burned and the feebleness of the agent of combustion. He enumerates the following peculiarities, as exemplified by most of the facts on record: 1. The extent and depth of the burns, as compared with the feeble proportion of combustible matter employed in their production. 2. Indulgence in spirituous liquors by the victims. 3. The far greater frequency of the occurrence in women, and especially old women, than in men. 4. The presence of an accidental determining cause. 5. So complete is the combustion in some cases that nothing but the ashes remain, and these are always of the same fatty soot. 6. The combustion, while acting on a mass of flesh and fat, has usually spared inflammable bodies in the vicinity. 7. The flame, when seen, has always been described as of a bluish color, and as inextinguishable. M. Devergie points out how these circumstances differ from those observed in the Countess's case, and in death from ordinary combustion. When this extends from the clothes to the person, very large superficial burns are produced, which from their very size prove fatal; but there is no instance of bodies becoming completely carbonized or reduced to the condition in which they are found in these cases. It is true that when the amount of combustible body exists in due proportion to the body to be

burned, we may see such effects produced, but the absence of this relation is the prime characteristic of these cases. A mere lamp or hot cinder suffices: while in the experiments made upon the Countess's body 125 pounds of wood had to be used. The other capital point is, the "isolation of the combustion amidst combustible bodies." The most inflammable substances remaining uninjured. In the Countess's case the floor and chairs, even at a distance, were burned. In M. Devergie's case, complete combustion of the body had taken place in a little wooden room, five or six feet broad by eight or nine feet long, and yet two muslin curtains at the windows were uninjured. In all the cases, too, abuse of alcohol is mentioned: and although Bischoff laughs at this as a mere invention of the persons of the vicinity, for the purpose of pointing a moral, it is too particularly specified in all the cases to admit of doubt, and it is to this abuse of alcohol that M. Devergie is disposed to attribute the production of the phenomenon. The quantity excreted by the urine and sweat is probably not in due relation to that imbibed: and a vital modification is impressed upon the tissues, by reason of which they become endowed with a greater combustibility, either mechanically, or by the transformation of the absorbed alcohol combined with the tissues into a new substance. Dr. Lindley has compiled a table of nineteen instances from the *Dictionnaire de Médecine*, of something akin to spontaneous combustion: namely, the rapid ignition of the human body (which *per se* is not combustible) by contact with flame, as a consequence of the saturation of its tissues by alcohol.

THE NATURAL SCIENCES.

EARTHQUAKES.

Earthquakes are produced by fractures and sudden heavings and subsidences in the elastic crust of the globe, from the pressure of the liquid fire, vapors, and gases in its interior, which there find vent, relieve the tension which the strata acquire during their slow refrigeration, and restore equilibrium. But whether the initial impulse be eruptive, or a sudden pressure upwards, the shock originating in that point is propagated through the elastic surface of the earth in a series of circular or oval undulations, similar to those produced by dropping a stone into a pool, and like them they become broader and lower as the distance increases, till they gradually subside; in this manner the shock travels through the land, becoming weaker and weaker till it terminates. When the impulse begins in the interior of a continent, the elastic wave is propagated through the solid crust of the earth as well as in sound through the air, and is transmitted from the former to the ocean, where it is finally spent and lost, or, if very powerful, is continued in the opposite land. Almost all the earthquakes, however, have their origin in the bed of the ocean, far from land, whence the shocks travel in undulations to the surrounding shores. No doubt many of small intensity are imperceptible; it is only the violent efforts of the internal forces, that can overcome the pressure of the ocean's bed, and that of the superincumbent water. The internal pressure is supposed to find relief most readily in a belt of great breadth that surrounds the land at a considerable distance from the coast, and, being formed of its

debris, the internal temperature is in a perpetual state of fluctuation, which would seem to give rise to sudden flexures and submarine eruptions. When the original impulse is a fracture or eruption of lava in the bed of the deep ocean, two kinds of waves or undulations are produced and propagated simultaneously,—one through the bed of the ocean, which is the true earthquake shock; and coincident with this a wave is formed and propagated on the surface of the ocean, which rolls to the shore, and reaches it in time to complete the destruction long after the shock or wave through the solid ocean-bed has arrived and spent itself on land. The height to which the surface of the ground is elevated, or the vertical height of the shock-wave, varies from one inch to two or three feet. This earth-wave, on passing under deep water, is imperceptible, but when it comes to soundings it carries with it to the land a long flat aqueous wave; on arriving at the beach the water drops in arrear from the superior velocity of the shock, so that at that moment the sea seems to recede before the great ocean-wave arrives. It is the small forced waves that give the shock to ships, and not the great wave; but when ships are struck in very deep water, the centre of disturbance is either immediately under, or very nearly under, the vessel. Three other series of undulations are formed simultaneously with the preceding, by which the sound of the explosion is conveyed through the earth, the ocean, and the air, with different velocities. That through the earth travels at the rate of from 7,000 to 10,000 feet in a second in hard rock, and somewhat less in looser materials, and arrives at the coast a short time before, or at the same moment with the shock, and produces the hollow sounds that are the harbingers of ruin; then follows a continuous succession of sounds, like the rolling of distant thunder, formed, first, by the wave that is propagated through the water of the sea, which travels at the rate of 4,700 feet in a second; and, lastly, by that passing through the air, which only takes place when the origin of the earthquake is a submarine explosion, and travels with a velocity of 1,123 feet in a second. The rolling sounds precede the arrival of the great wave on the coasts, and are continued after the terrific catastrophe when the eruption is extensive. When there is a succession of shocks all the phenomena are repeated. The velocity of the great oceanic wave varies as the square root of the depth; it consequently has a rapid progress through deep water, and less when it comes to soundings. The velocity of the shock varies with the elasticity of the strata it passes through. The undulations of the earth are subject to the same laws as those of light and sound; hence, when the shock or earth-wave passes through strata of

different elasticity, it will partly be reflected, and a wave will be sent back, producing a shock in a contrary direction, and partly refracted, or its course changed, so that shocks will occur both upwards and downwards, to the right or to the left of the original line of transit. Hence most damage is done at the junction of deep alluvial plains with the hard strata of the mountains, as in the great earthquake in Calabria in the year 1783. When the height of the undulations is small, the earthquake will be a horizontal motion, which is the least destructive; when the height is great, the vertical and horizontal motions are combined, and the effect is terrible; but the worst of all is a verticose or twisting motion, which nothing can resist. It is occasioned by the crossing of two waves of horizontal vibration, which unite at their point of intersection and form a rotatory movement. There are few places where the earth is long at rest; for, independently of those secular elevations and subsidences that are in progress over such extensive tracts of country, small earthquake shocks must be much more frequent than we imagine, though imperceptible to our senses, and only to be detected by means of instruments. The shock of an earthquake at Lyons in February, 1822, was not generally perceptible at Paris, yet the wave reached and passed under that city, and was detected by the swinging of the large declination needle at the Observatory, which had previously been at rest. Even in Scotland 139 slight shocks have been registered within a few years, of which 81 occurred at Comril, in Perthshire, but the cause is at no great depth under the surface, as the shocks extended to a small distance. The undulations of some of the great earthquakes have spread to an enormous extent: that which destroyed Lisbon had its origin immediately under the devoted city, from whence the shock extended over an area of about 700,000 square miles, or a twelfth part of the circumference of the globe: the West Indian islands, and the lakes in Scotland, Norway, and Sweden, were agitated by it. It began without warning, and in five minutes the city was a heap of ruins. The earthquake of 1783, in Calabria, which completely changed the face of the country, lasted only two minutes, but it was not very extensive. Sometimes a shock has been carried underground which was not felt at the surface, as in the year 1802, in the silver mine of Marienberg, in the Hartz. In some instances miners have been insensible to shocks felt on the surface above, which happened at Fahlun, in Sweden, in 1823—circumstances depending, in both instances, on the elasticity of the strata, the depth of the impulses, or obstacles that may have changed the course of the terrestrial undulation. During earthquakes, dislocations of strata take place, the course

of rivers is changed, and in some instances they have been permanently dried up, rocks are hurled down, masses raised up, and the configuration of the country altered; but if there be no fracture at the point of original impulse, there will be no noise.—SOMERVILLE'S *Physical Geography*.

ROTUNDITY OF THE EARTH.

The truth of this doctrine is familiarly illustrated by the phenomena of the heavens, as well as by terrestrial appearances. Indeed, the spherical form of the earth is the fundamental principle of all mathematical geography. But it has been asked how the earth can remain suspended in the air without any support? Let us look upon the heavens, and observe how many other globes roll in space. The force which supports them is unknown to us; but we see its effects, and we investigate the laws according to which these effects take place. Let us, then, lay aside all uneasiness concerning the *antipodes*, that is, the people of the earth whose feet are turned towards ours: there is upon the globe neither high nor low; the antipodes see, in like manner as we do, the earth is under their feet, and the sky over their heads.

Homer supposed that under the earth was placed a range of columns guarded by Atlas; the Scandinavians believed the earth to rest upon nine pillars; and the worshippers of Bramah thought our globe supported upon four elephants. Upon what would these elephants or these columns rest? Our thoughts, however far they proceed, must always at length stop short, and affrighted, recoil from that infinity which surrounds us on every side, and which it is folly to attempt to comprehend. But some more reasonable observers will say: Do not the Andes and the Alps make it evident that the earth is an irregular body, and not all round? We answer: one of the highest mountains known is Chimborazo, in Peru, which rises to 21,424 feet above the surface of the sea. This height is nearly $\frac{1}{5050}$ of the earth's greatest circumference, and $\frac{1}{1950}$ of its axis. Upon an artificial globe of 21 feet in circumference, or of $6\frac{2}{3}$ feet in diameter, Chimborazo could only be represented by a grain of sand less than one-twentieth of an inch in thickness. Irregularities so imperceptible do not deserve to be taken into consideration.—MALTEBRUN.

CHANGES OF THE RELATIVE LEVEL OF THE SEA AND LAND.

At the conclusion of an elaborate paper in Jameson's Journal, Robert Chambers says: "The general fact may now be considered as tolerably certain, that there is a district in Finmark, of 40 geographical

miles in extent, which has sunk 58 feet at one extremity, and risen 96 at the other. Its line of dip and of rise is not greatly different from that of the magnetic meridian for the district, which is about 11° west of north. As a general thing, the movement has been surprisingly equable over relative proportions of the space. There is a large tract in the south and east of Scandinavia, which is ascertained to be undergoing an elevatory movement, even at the present day. Thus, on the stone at Lofsgrund, which has been marked with the height of the water at various periods, but lastly by Lyell, in 1834, Mr. Chambers found the mark of Mr. L. 2 feet 7 inches below that of 1731, and the sea was already about 6 inches below that of Lyell, or over 3 feet below that made 118 years before. On another stone Mr. C. found a mark made in 1820, 11 inches above the present level of the sea, thus indicating a rise of the land to that amount since that period.

Prof. Nilsson, in a work on the existence of man in Scandinavia previous to the historic age, states that a prominent rock in the harbor of Fyellbacke has offered opportunities of careful examination; and hence it has been established, that in 1532 the rock was two feet below the surface, in 1742 two feet and in 1844 four feet above the surface. Thus it has risen six feet in 300 years, or at the regular rate of one foot in fifty years. The same writer, in a paper read to the British Association, states that the subsidence of the extreme southern part of Sweden, in comparatively recent times, is indicated by the occurrence of peat-bogs in Scania, from 14 to 20 feet below the level of the Baltic, yet containing human skeletons and weapons, associated with the bones of the *Aurochs* and other existing animals. Further north, instead of the land subsiding, it has long been rising from the sea, and raised beaches and terraces of gravel containing sea-shells and human skulls of Celtic races have been long well known.

FORMER UNION OF AFRICA AND EUROPE.

Africa, a flat line of desert sand, rises abruptly out of the sea in a tremendous jumble, backed by the eternal snows of the Atlas. Two continents lie before us: we have reached the extremities of the ancient world. The separated continents stand aloof; they were once united; a dreary sea now flows between them, and separates them for ever. The straits are narrowest at Tarifa, and do not exceed twelve miles across; and their gradual widening is historically certain. That the two continents were united is proved by geological evidence. Tradition refers the cutting through the isthmus to Hercules, that is, to a canal opened by the Phœnicians, who were acquainted with those of

Suez and Sesostris. Scylax, who wrote five centuries before Christ, estimated the breadth at half a mile; Euctemon, who wrote one hundred years after Scylax, at four miles; Turranius Gracilis, a Spaniard, who lived on the spot three centuries later, and is quoted by Pliny, at five; Livy and Cornelius Nepos, at six; Procopius, at ten; and Victor Vitensis at twelve. The elevated coast on each side has rendered further enlargement impossible.—*Quarterly Review.*

HIGH TEMPERATURE OF ANCIENT EUROPE.

The fossil floras of France, England, Germany, and Scandinavia, exhibit ferns nearly fifty feet high, and with branches three feet in diameter, or nine feet in circumference. The lycopodia, which, at the present time, in cold or temperate regions, are creeping plants, scarcely rising above the surface; which, even at the equator, under the most favorable circumstances, do not rise to more than three feet,—reached in Europe, in the ancient world, to the height of eighty feet. One must be blind not to see in these enormous dimensions a new proof of the High Temperature formerly possessed by our country before the last irruption of the ocean.—ARAGO's *Eloge of Fourier.*

CAUSE OF THE DIRECTION OF MINERAL VEINS.

Copper lodes have generally an easterly and westerly direction. Lead lodes commonly run from north to south, or nearly so. If, after a lode has been formed, it becomes dislocated, and one portion of it has its line of direction changed a few degrees by the movement of a portion of the earth's crust, by no means an unusual occurrence, the character of the mineral immediately undergoes a change. The main direction of the copper lodes of Cornwall, England, is from the north-east to the south-west, or nearly so; and these lodes contain, almost invariably, the yellow copper-ore. In the St. Just district of Cornwall, northward from the Land's End, by some great convulsion of nature, we find the ground greatly disturbed, and the mineral lodes have a direction from the south-east to the north-west; the copper-ore in all these mineral veins is the gray sulphuret, and they are very peculiarly characterized by the peroxide of iron which abounds. From these facts we learn, that the position determines, or, at all events, regulates, the character of the metalliferous deposits; one kind of mineral prevailing when the receiving fissure has been formed in one direction, and another when it has exhibited any deviation from that line. Phenomena of this kind appear to lead, as by a natural infer-

ence, to the conclusion, that some law of polarity has been at work; and we know of no physical force to which we can so appropriately refer the deposition of metalliferous ore in a rock-fissure as to electricity.

ARTESIAN WELLS.

These overflowing Wells were named from having been long known and used in the province of Artois, in France. Their principle is the same as that of an artificial fountain. Thus, imagine a somewhat basin-shaped bed of sand, chalk, or any rock of a porous nature, to lie upon a stratum of clay impermeable to water, and to be covered by another stratum equally impermeable. The former bed, being saturated to a great extent by the water which flows into it from its higher and exposed edges—a hilly region, perhaps, where rain falls in abundance—becomes a reservoir, which, if an opening is bored down into it through the overlying clay, will discharge its waters upwards, with a force determined by the level at which they are kept in the reservoir, the rate at which they can percolate through its substance, and the size of the orifice; and in proportion as this reservoir is tapped by the borer, must the supply it affords on its upper margin be diminished.

THE "PROVIDENTIAL" ARRANGEMENT OF THE ALPINE REGIONS.

But the longer I stayed among the Alps, and the more closely I examined them, the more I was struck by the one broad fact of there being a vast Alpine plateau, or mass of elevated land, upon which nearly all the highest peaks stood like children set upon a table, removed, in most cases, far back from the edge of the plateau, as if for fear of their falling. And the result of this arrangement is a kind of division of the whole of Switzerland into an upper and lower mountain world; the lower mountain consisting of rich valleys, bordered by steep but easily accessible wooded banks of mountain, more or less divided by ravines, through which glimpses are caught of the higher Alps; the upper world, reached after the first steep banks of 3,000 or 4,000 feet in height, have been surmounted, consisting of comparatively level but most desolate traces of moor and rock, half covered by glacier, and stretching to the feet of the true pinnacles of the chain. It can hardly be necessary to point out the perfect wisdom and kindness of this arrangement, as a provision for the safety of the inhabitants of the high mountain regions. If the great peaks rose at once

from the deepest valleys, every stone which was struck from the pinnacles, and every snow-wreath which slipped from their ledges, would descend at once upon the inhabitable ground, over which no year would pass without recording some calamity of earthslip or avalanche. Besides this, the masses of snow, cast down at once into the warmer air, would all melt rapidly in the spring, causing furious inundations of every great river for a month or six weeks. All these calamities are prevented by the peculiar Alpine structure which has been described. The broken rocks and the sliding snow of the high peaks, instead of being dashed at once to the vales, are caught upon the desolate shelves or shoulders which every where surround the central crests. The soft banks which terminate these shelves, traversed by no falling fragments, clothe themselves with richest wood; while the masses of snow heaped upon the ledge above them, in a climate neither so warm as to thaw them quickly in the spring, nor so cold as to protect them from all the power of the summer sun, either form themselves into glaciers or remain in slowly-wasting fields even to the close of the year—in either case supplying constant, abundant, and regular streams to the villages and pastures beneath, and to the rest of Europe noble and navigable rivers.—RUSKIN.

ORIGIN OF AMBER.

Amber is found in many countries. It is particularly abundant on the shores of the Baltic; but is also found in Sicily, the Indian Seas, China, Siberia, North America, Madagascar, &c. The following facts show that the origin of amber goes back to the tertiary epoch, and that it is to be assigned to a resin which flowed from the trunk of certain trees of that era:

1st, We find amber in beds of tertiary lignites, in the form of numerous fragments lying between the trunks of amber trees. It is true that this substance has never been found adhering directly to any of the trunks; but the position of the fragments seems to admit of no doubt. 2d, The analogy between copal and amber evidently indicates a similar origin. Their consistency, their color, their nature, and the fact that they both enclose organic remains, prove this resemblance; and concur in showing that amber, like copal, and many modern resins and gums, has flowed from the trunk and branches of a vegetable. It is probable that the large and irregular masses are the produce of the trunk, that the smaller ones have come from the branches, and that those which have a slaty structure have been formed by a series of

layers. The roots probably produced none. The great quantity thrown up by the Baltic Sea is probably owing to the existence of a considerable bed, situate in the south-west quarter of the present basin of that sea, towards 55° north latitude, whence the winds convey it by diverging to the different points of the coasts of Prussia. This must have been the principal place where Baltic amber was formed, and the site of the forest which produced it. This forest probably flourished on a low island, which marine currents issuing from the north subsequently submerged and destroyed.

MALACHITE

Is considered by Sir Roderick Murchison to be a wonderful subterraneous incrustation, which was produced in the stalagmitic form, during a series of ages, by copper solutions emanating from the surrounding loose and porous mass, and trickling through it, to the lowest cavity, upon the subjacent solid rock. At the bottom of one of the shafts of the copper-works of the Ural, 280 feet deep, there was found, a few years since, an enormous mass of Malachite, sending off strings of green copper-ore: it was estimated to contain 15,000 poods, or half-a-million pounds of pure and compact Malachite. This fine emerald-green mineral is extensively used for veneering and *inlaid* work; its value, when manufactured, is upwards of three guineas per pound, and a square foot of finished work generally contains at least two pounds and a half.

THE SWISS GLACIERS

A Glacier is a mass of ice which descends below the usual snow line, from the snow reservoirs in the higher alpine regions, through the rocky channels of the alpine valleys and gorges. When seen from some distance, and from a spot sufficiently elevated, the general appearance of a glacier is that of an immense torrent tumbling and rushing tumultuously through the sinuosities of its bed, to precipitate itself into the valley below, but which has been suddenly stopped in its headlong course, and unalterably fixed at some mysterious and resistless bidding. There are about four hundred of these frozen masses in the alpine chain, the greater part of which are from six to seven leagues in length by half or three-quarters of a league in breadth, and varying from one to six hundred feet in depth; and it is computed that the glaciers between Switzerland and Mount Blanc, and on the frontiers of the Tyrol, would form a single glacier of about 180 square

leagues. It is seldom that a glacier consists of only one bed or stream; in general, tributary glaciers descend from the lateral valleys, and blend with the main stream just as several rivers unite to form a larger one. Every glacier has peculiar characteristics of its own, which are often continued far beyond the junction of the separate streams; exactly as the waters of different rivers refuse for a time to intermingle. The glacier terminates at the lower extremity in a great promontory of ice protruding itself into cultivated and habitable valleys, and from its terminal base issues a stream more or less considerable according to the size of the glacier, through one or more natural arches in the ice. Those mighty streams, the Rhone and the Rhine, and many other rivers, are of glacier origin, draining, as it were, the Alps, and forming in summer, when other waters are evaporated and dried up, everlasting fountains of fertility and plenty to the whole continent of Europe. The edges of the glaciers are more or less inclined towards their containing walls or boundaries, the declivity being caused by the melting and depression of the ice at the sides, in consequence of the accumulated heat reflected from the adjacent rocks, aided by the color and composition of the rocks themselves, the direction and exposure of the valleys forming the glacier bed, and the character of the prevailing winds and currents of the locality; so that the middle of the glacier is raised above its general level, the surface forming a curve. Every glacier consists of three distinct and well-defined regions, each characterized by peculiarity of structure, not abruptly separated, however, but passing insensibly into each other. The more elevated parts consist of fields of fine and powdery snow, which cover the slopes of the mountain summits and crests, and the plateaux or connecting surfaces between them. At a certain depth these fields of powdery snow pass into a coarse granular snow, or imperfect ice, constituting the second portion of the glacier, and forming a band or zone about 1,000 feet in breadth. This substance is not consolidated like common ice, but yields beneath the feet, as grain or fine gravel would do. The third or lower region, to which the name glacier is more specifically applied, is composed of compact, rough, uneven ice. This part of the structure commences about 800 feet above the level of the sea. It is composed of polyhedral fragments of ice, from half an inch to two or three inches in diameter, increasing in size as the extremity of the glacier is approached, and separated from each other by capillary fissures. Of all the characteristics of the glaciers, that which is most calculated to excite our surprise and curiosity is its regular motion of progression. Its advance,

though noiseless and incapable of being observed by the eye, is steady and continual. Of this motion, which is always in the direction of the declivity—the forward march of the masses of rocks and other matters on the surface, which can be traced from year to year, and even from day to day—the totally different character of those rocks from that of the lateral rocks, clearly identifying them as belonging to localities thousands of feet above the spots where they are found—and the accumulation of those materials at the extremity of the glacier—of themselves constitute sufficient proofs.

SIZE OF GLACIERS.

It is scarcely possible to estimate the quantity of ice in the Alps; it is said, however, that, independent of the glaciers in the Grisons, there are 1500 square miles of ice in the Alpine range, from eighty to six hundred feet thick. Some glaciers have been permanent and stationary in the Alps, time immemorial, while others now occupy ground formerly bearing corn or covered with trees, which the irresistible force of the ice has swept away. These ice rivers, formed on the snow-clad summits of the mountains, fill the hollows and high valleys; hang on the declivities, or descend by their weight through the transverse valleys to the plains, where they are cut short by the increased temperature, and deposit those accumulations of rocks and rubbish, called moraines, which had fallen upon them from the heights above. In the Alps the glaciers move at the rate of from twelve to twenty feet annually, and, as in rivers, the motion is most rapid in the centre. They advance or retreat according to the mildness or severity of the season; but they have been subject to cycles of unknown duration. From the moraines, as well as the striæ engraven on the rocks over which they have passed, Agassiz has ascertained that the valley of Chamouni was at one time occupied by a glacier, that had moved towards the Col de Balme. A moraine 2000 feet above the Rhone, at St. Maurice, shows that at a remote period, glaciers had covered Switzerland to the height of 2155 feet above the lake of Geneva. Their increase is now limited by various circumstances, as the mean temperature of the earth, which is always above the freezing point in those latitudes; excessive evaporation; and blasts of hot air, which occur at all heights, in the night as well as in the day, from some unknown cause. They are not peculiar to the Alps, but have been observed, also, on the glaciers of the Andes. Besides, the greater the quantity of snow in the higher Alps, the lower is the glacier forced into the plains.—SOMMERVILLE'S *Physical Geography*.

THE UNIVERSALITY OF FOSSILS.

The quantity of fossil remains is so great, that probably not a particle of matter exists on the surface of the earth that has not at some time formed part of a living creature. Since the commencement of animated existence, zoophytes have built coral reefs extending hundreds of miles, and mountains of limestone are full of their remains all over the globe. Mines of shells are worked to make lime; ranges of hills and rock, many hundred feet thick, are almost entirely composed of them, and they abound in every mountain-chain throughout the earth. The prodigious quantity of microscopic shells discovered by Ehrenberg, is still more astonishing; shells not larger than a grain of sand form entire mountains; a great portion of the hills of Casciano, in Tuscany, consists of chambered shells, so minute, that Saldani collected 10,454 of them from one ounce of stone. Chalk is often almost entirely composed of shells; the polishing property of tripoli is owing to their silicious coats; and there are even hills of great extent consisting of this substance, the débris of an infinite variety of microscopic insects.—SOMERVILLE's *Physical Geography.*

ANTEDILUVIAN ANIMALS.

The animals of the Antediluvian World were not monstrous: there was no lusus or extravagance. Hideous as they appear to us, and like the phantoms of a dream, they were adapted to the condition of the earth when they existed. We have the plesiosaurus, the plesiosaurus dolichodeirus; we have the ichthyosaurus and megalosaurus and iguanodon, pterodactyles with long and short beaks, tortoises and crocodiles; and there were found among reeds and grasses of gigantic proportions, algæ and fuci, and a great variety of mollusca of inordinate bulk, compared with those of the present day, as ammonites and nautili. Every thing declares that these animals inhabited shallow seas and estuaries, or great inland lakes; that the surface of the earth did not rise up in peaks and mountains, or that perpendicular rocks abounded in the seas, but that it was flat, slimy, and covered with a loaded and foggy atmosphere. There is, indeed, every reason to believe that the classes of mammalia and birds were not then created; and that if man had been placed in this condition of the earth, there must have been around him a state of things unsuited to his constitution, and not calculated to call forth his capacities. But, looking to the class of animals as we have enumerated them, there is a correspondence: they were scaly; they swam in water, or crept upon the margins; there

were no animals possessed of rapidity of motion, and no birds of prey to stoop upon them; there was, in short, that balance of the power of destruction and of self-preservation which we seek now to obtain in higher animals since created, with infinitely varied instincts and means for defence and attack.—SIR CHARLES BELL, *on the Hand.*

ANTIQUITY OF SHEEP ON THE EARTH.

No unequivocal fossil remains of the sheep have yet been found in the bone-caves, the drift, or the more tranquil stratified newer pleiocene deposits, so associated with the fossil bones of oxen, wild boar, wolves, foxes, otters, beavers, &c., as to indicate the coevality of the sheep with those species, or in such an altered state as to indicate them to have been of equal antiquity. Wherever the truly characteristic parts, viz., the bony cores of the horns, have been found associated with jaws, teeth and other parts of the skeleton of a ruminant, corresponding in size and other characters with those of the goat and sheep in the formations of the newer pleiocene period, such supports of the horn have proved to be those of the goat. No fossil horn-core of a sheep has yet anywhere been discovered; and so far as this negative evidence goes, we may infer, that the sheep is not geologically more ancient than man; that it is not a native of Europe, but has been introduced by the tribes who carried hither the germs of civilization in their migrations westward from Asia.—PROF. OWEN'S *Lecture before Society of Arts.*

OPIUM, AND THE OPIUM TRADE.

Opium, as is well known, is the production of the plant *Papaver somniferum*, called in English the Poppy. This plant was originally a native of Persia, but is now found growing as an ornamental plant in gardens throughout the civilized world. It is most extensively cultivated in India, where it is estimated that more that 100,000 acres of the rich plains of that country are occupied for this purpose, giving employment to many thousand men, women and children. Its cultivation throughout is very simple. The seed is sown in November, and the juice is collected during a period of about 6 weeks in February and March. The falling of the flowers from the plant is the signal for making incisions, which is done in the cool of the evening, with hooked knives, in a circular manner, around the capsules. From these incisions a white milky juice exudes, which is concreted into a dark-brown mass by the heat of the next day's sun; and this being scraped off every evening as the plant continues to exude, it consti-

tutes opium in its crude state. India, it is said, produces 40,000 chests of opium annually, each chest varying in weight from 125 to 140 pounds. Two of the principal localities for cultivation of this drug, in Bengal, are subject to the East India Company, and the manufacture and traffic in it is a strict monopoly of the government. In the others, there is a most oppressive system of espionage established over the natives, to an extent which throws the control of the traffic into the hands of the same Company. On that which is raised in Maleva, a province lying in the western part of India, beyond the East India Company's control, and which, in order to reach Bombay, the principal market, has to pass through certain territories of the Company, a transit duty of 400 rupees is levied. The income from this tax, in 1846, was £1,000,000, which, with the revenue received the same year at Calcutta from the article, makes the sum total of income to the Company from it £3,000,000. The idea of sending opium from Bengal to China, originated in 1767. From this time to 1794, the trade in it met with but poor success. In the latter year the English succeeded in stationing one of their ships laden with opium at Whampoa, where, for more than a year, she lay unmolested, selling out her cargo. In 1821, owing to the difficulties attending the sale at these places, the opium merchants withdrew all their vessels from Whampoa and Macao, and stationed them under the shelter of Lintin Island, in the bay, at the entrance of Canton river, which henceforth became the seat of extensive trade. From these vessels it was taken in Chinese junks and smugglers' boats, and retailed at various ports along the shore. In 1847, it is said about fifty vessels were engaged exclusively in this trade, besides a greater or less number which were only partially freighted with the drug. It is stated that two and a half millions of dollars' worth of opium is annually imported into Foochow, from whence it finds its way into the interior. In that city alone, there were in 1848 one hundred houses devoted to the smoking of the drug, while as many retailed the poison in small quantities. As respects the progress and present extent of the trade, it is said that from 1794 to 1820, the amount exported to China varied from 3,000 to 7,000 chests per year. In 1837, it amounted to between 39,000 and 40,000 chests, valued at $25,000,000. From 1838 to 1842 the trade was almost entirely interrupted by the war, which grew out of the attempts of the Chinese government to suppress it. At the conclusion of the war, the trade was resumed with renewed vigor. For the year 1848, the amount imported into China from Bombay was 19,111 chests, and from Calcutta 36,000 chests, which, at an average of

$550 per chest, would amount to $32,000,000 expended for this single article of trade. Then the Chinese pay an advance on this sum of several millions more, which goes into the hands of the merchants as the fruits of their investment and labors in the trade. All this sum has been paid in specie, or Chinese sycee, which is the purest of silver. The Chinese government have made strong efforts to cut off or restrict the traffic in this drug. Public attention was directed to its injurious effects in 1799, and in 1809 an edict was issued requiring all ships discharging their cargoes at Whampoa, to give bonds that they had no opium on board. Still more stringent laws were adopted in 1820. In 1834, an edict was issued, declaring that the injury done by the influence of opium, and by the increase of those who inhaled it, was nearly equal to a general conflagration, and denouncing upon the seller and smoker of the poison the bastinado, the wooden collar, imprisonment, banishment, confiscation of property, and even death by public decapitation or strangulation. But notwithstanding all this, the trade kept increasing, until at length an imperial commissioner was appointed, clothed with the highest authority and power, to proceed to Canton and endeavor to effect an utter annihilation of the trade. In carrying out this determination, he seized and destroyed some 20,280 chests of opium, and compelled the merchants to sign a bond that they would for ever cease trading in the article. This bold and decided measure on the part of the commissioner led to the war with England, which is commonly known as the opium war. One result of the war was the ceding of the island of Hong Kong to the English. In this island, after passing into the hands of the victors, the trade in opium was legalized, and twenty shops for its sale immediately licensed, within gun-shot of the Chinese Empire, where such an offence is punishable with death. It is stated upon the highest authority, that the British government in India could not be sustained without the immense revenue derived from this trade. This revenue for the last six years, it is said, has amounted to nearly $80,000,000. It is also estimated that the immense sum of $400,000,000 of specie has been drained from China to pay for this single article alone, within the last half century.

GEOGRAPHICAL BOTANY.

This doctrine of the preservation in the earth of stores of seeds retaining for ages their powers of germination is a popular one, supported by men of great authority, and to which De Candolle often reverts. Carried down by torrents, deposited in the beds of rivers or

canals, drawn into the earth by animals, who hoard them for their winter store, dropped into fissures formed by summer droughts, buried by accidental disturbances of the soil,—he believes that seeds swarm in the upper strata of the earth's surface, forming a kind of magazine, whence they are ready to germinate in after ages when accident turns them up to the surface itself. This is a very common idea caused by the appearance of vast quantities of some plant not previously observed, when extensive cuttings or embankments have turned up the substrata of the soil. It is a convenient resource by which to account for a number of analogous phenomena, such as the substitution of beech to pines, or vice versâ, on the cutting down of a forest, the peculiar vegetation which will appear in the bed of a canal or piece of water when first drained off, &c. We cannot, however, but entertain considerable doubts on the subject. No one that we are aware of has ever detected any considerable depot of good seeds in the ground. Nor do we believe in the powers of seeds to preserve their vitality so long. It is well known that some lose their power of germination after a few months, or even a much shorter period, the generality under favorable circumstances will preserve it for one, two, three or more years. After twenty years, as far as observation goes, the great majority are dead, although some kinds of seed have been known to germinate after fifty years; and we have heard that Mr. Brown has caused a melumbium seed to germinate which remained for a hundred and twenty years in Sir Hans Sloane's collection. But these cases are rare and exceptionable. The seeds have been thoroughly dried, and kept in a condition known to be essential to prolong their dormant life; and there is a vast difference between these extreme periods and the many hundreds, or even thousands, of years during which we are required to believe that they are preserved in the ground under very unfavorable circumstances. Seeds, we readily admit, are shed every year upon the surface of the earth in countless myriads, but so many are the enemies they meet with, that scarcely one is to be found the following season. A large proportion may germinate, either immediately or as soon as the season affords them sufficient heat to excite them, but most of these perish in infancy, starved by the climate, or by want of appropriate nourishment, stifled by the surrounding, vegetation or devoured by animals; a still greater number—nearly all, indeed of some species—are destroyed in the seed state by insects, by birds, or other animals; some rot away from the humidity of the soil, and others, though apparently still sound, have lost their vitality in consequence of a slight fermentation in the albumen or cotyledons;

and to all these causes of death seeds enclosed in the earth are particularly exposed. We never did believe in the germination of mummy wheat thousands of years old, and the fallacy of the best authenticated stories on the subject is now generally admitted. As for the raspberries said to have been raised from seeds found amongst the human remains buried under the Cornish barrows, we cannot consider the case as in every respect so well authenticated as to be entirely beyond the reach of doubt. If, for instance, the seeds so found were early exhibited, with recent seeds placed next to them for comparison, some of the latter may have actually got mixed with them or substituted for them at some period or other;—in short, we would rather imagine any improbable accident or intentional trick, than believe, without the corroborative evidence of other less extreme cases, that seeds having been thrown by digestion and subsequent immersion in decaying animal matter into circumstances well known to promote either immediate germination or destructive fermentation, should, on the contrary, have preserved their dormant life for an unheard-of period of time. The causes of these sudden appearances of plants previously unobserved—of such natural alternations of crops, as it were —must be sought for in some accidental, unnoticed, but comparatively recent dissemination of seeds on ground which may, within a limited period, become vacant by the turning up of soil, by the cutting down of forests, or similar incidents, and thus, more or less, freed from the enemies, vegetable or animal, which would otherwise have stifled or destroyed the new crop at its birth.—*Edinburgh Review*, Oct., 1856.

PECULIARITIES OF FLOWERS.

The Patent Office Report for 1848 gives the results of some observations made by a German botanist on the growth of certain plants. His experiments were made with briony, parcala, elder, and flax. "The growth of these plants advanced uninterruptedly by day and night; but, with the exception of the flax, the growth was more by day than by night. Further, the observations made on the briony the first day showed, that, with the increase of the heat of the sun, the growth of the outward portions of the plants fell off, and also in disturbed and rainy weather. Flax grows on an average more in the night than in the day, and more in troubled weather than in sunshine, —a proof that it requires for its success a moist atmosphere."

The same report also contains the result of the observations of

another botanist, on the coloring of flowers. The coloring of flowers is intimately connected with the alternations of the seasons. "In considering the vegetables of our country (Germany), either in a mass or in groups, we see invariably that the number of flowers increases from December to July. White flowers are the most numerous during the whole period of the year when plants are seen in blossom; after these come the yellow, then the orange, the blue, the violet, the green, and, lastly, the indigo flowers, which are the most uncommon. The law according to which the increase of flowering takes place, shows itself to be closely connected with the mean temperature: but from time to time anomalies are exhibited, which the change of temperature alone cannot explain; such is the rapid decrease of the number of flowering plants from the end of July to that of August. From the month of January, when all the flowers are white, to the vernal equinox, the relative number of white flowers rapidly decreases; after that period the proportion increases till the middle of May, and then insensibly diminishes till the time when the frosts arrest all vegetation. If we set aside the very small number of yellow flowers which appear in February and March, we see that the proportion of flowers of that color increases from the beginning of April to the end of June, then it remains stationary till the middle of August, after which it increases again till the frosts come. The proportional number of red flowers gradually diminishes from February to the end of April, then recovers the ascending scale till the end of August, after which it decreases till October; it then rises again till November, when most of the cultivated flowers are of that color. The green or greenish flowers diminish from March till the end of May, and after this the proportion is about uniformly maintained till winter. Blue flowers increase to the middle of April, then decrease to the summer solstice, then ascend to the number reached in April, after which they rapidly decrease, and totally cease on the arrival of the frosts." The other colors are not regular enough to allow of the giving of a rule for them. The author of these observations has arranged the increase and decrease of the colors in tables, to show them at a glance. It is then seen that each color rises twice and decreases twice. Whenever the white flowers increase, the yellow decrease, and vice versâ. The red and green always correspond, as do the blue and violet flowers. These laws apply to species, not to individuals. The same botanist finds, that the number of plants opening their corolla during the night is very small, compared with that of those blossoming during the day, being only about 12 per cent.

SLEEP OF ARCTIC PLANTS.

Mr. Seeman, the naturalist of Kellett's Arctic expedition, mentions a curious fact respecting the condition of the vegetable world during the long day of the Arctic summer. Although the sun never sets while it lasts, plants make no mistake about the time, when, if it be not night, it ought to be; but regularly as the evening hours approach, and when a midnight sun is several degrees above the horizon, droop their leaves and sleep even as they do in more favored climes.

MUMMY WHEAT.

Sir Gardner Wilkinson opened in the Thebaid an ancient tomb, which had probably remained unvisited by man for nearly three thousand years; and from some alabaster vases he took a quantity of wheat and barley that had been preserved in them. In 1840 a few of these grains were planted in an open garden at Albury near Guilford, and there flourished. The increase of the wheat was very great, the ears averaging seven inches long, and from fifteen to twenty ears on each root, springing from one grain: it was "bearded," and resembled that which is sometimes called by farmers "Egyptian wheat." Other instances are related of this resuscitated wheat: thus, in 1842, a specimen of Egyptian wheat, from a mummy imported in 1839, was in luxuriant growth in the Botanic Society's Garden at Bath; and, in 1841, a sample of wheat grown from seed taken from a mummy was shown to the British Association by Mr. Long, of Hurts Hall, Suffolk.

THE CLOVE

Is the unexpanded flower-bud of the *Caryophyllus aromaticus.* It has been brought into the European market for more than 2,000 years. The plant is a native of the Moluccas and other islands in the Chinese seas. "A fine tree has been known to yield 125 lbs. of this spice in a single season; and as 5,000 cloves only weigh one pound, there must, at least, have been 625,000 flowers upon this single tree."—BURNETT. In Amboyna, the average crop may be reckoned at 250,000 or 300,000 lbs.

WHAT IS RED SNOW?

The accounts of Red Snow in the journals of Ross, Parry, and other Arctic voyagers, were at first received with some doubt; nor was the phenomenon rightly understood until the microscope had revealed its minute organism. M. Justice has by this means ascertained

the Red Snow (*Protococcus nivalis*) to be a globular cyst, varying in size from the 1-2500th of an inch to the 1-1000th of an inch in diameter; each cell or cyst, having an opening, whose smallest diameter measures only the 1-5000th part of an inch. The "snow," when perfect, resembles the red currant of our gardens; as it decays, the red coloring matter is lost, being gradually superseded by a deep orange, which finally appears to change into a brown, or the cell becomes transparent. In this transparent state, when the cell is broken, the thickness of the enveloping cuticle may be measured; this does not exceed the 1-2000th part of an inch; and where the opening is preserved, the interior of it becomes of a delicate green color.

WHAT IS BLUE MOULD?

A species of fungus which grows on damp and putrefying fruit, bread, cheese, &c., and on plants while drying for the herbarium, if not regularly shifted. The economy of this plant is interesting. At first some white cobweb-like filaments spread over the substance infected, whence sprouts up a thick forest of other filaments about one-eighth of an inch in height, pellucid, tubular, and obscurely marked with one or two joints. Each filament is terminated with a globe, minute to our enlarged vision, but large and heavy when compared with the slender stalk which supports it. This globe is entirely composed of pellucid grains, compacted and arranged in lines of perfect uniformity.

EDIBLE MUSHROOMS.

The confused notions which most persons have respecting the distinction of Edible and Poisonous Mushrooms, has led to fatal consequences. The following indications may, therefore, in some degree, serve to correct the evil. Whenever a fungus is pleasant in flavor and odor, it may be considered wholesome; if, on the contrary, it have an offensive smell, a bitter, astringent, or styptic taste, or even if it leave an unpleasant flavor in the mouth, it should not be considered fit for food. The color, figure and texture of these vegetables do not afford any characters on which we can safely rely; yet, it may be remarked, that in color, the pure yellow, gold color, bluish pale, dark or lustre brown, wine-red, or the violet, belong to many that are esculent; whilst the pale or sulphur-yellow, bright or blood-red, and the greenish, belong to few but the poisonous. The safe kinds have most frequently a compact brittle texture; the flesh is white; they grow more readily in open places, such as dry pastures and waste lands, than in

places humid, or shaded by wood. In general, those should be suspected which grow in caverns and subterraneous passages, on animal matter undergoing putrefaction, as well as those whose flesh is soft or watery.—BRANDE's *Journal.*

VEGETABLE IVORY.

This Ivory-nut is the produce of a tree found on the banks of the Magdalena, in Colombia, where the natives call it Tagua, or Cabeza de Negro (negro's head), in allusion to the figure of the nut. The fruit at first contains a clear insipid fluid, which becomes milky and sweet, till it acquires solidity, and is almost as hard as ivory. Of it the Indians make little toys which are whiter than ivory, and as hard if not put under water; and if they are, they become white and hard again when dried. The tree is a palm, and the part of the kernel which resembles ivory is the albumen or nutritious substance which surrounds the embryo, and is destined to feed it when it begins to grow. The Doum Palm of Thebes, the fruit of which is called "ginger-bread-nuts" at Alexandria, has a similar albumen, which is turned into beads for rosaries. The albumen of the Double Cocoa-nut is similarly employed.

THE APPLE.

Apples have been believed by some to have been introduced into Italy from Media, and that the Falisci, or inhabitants of Montefiascone, were the first to plant them in rows. But this must apply to some particular variety, not to the species. Pliny enumerates twenty-three varieties, which appear still more difficult to identify with ours than the pears. Among the few that modern authors have recognized, the Appiani of the Romans are supposed to be the Appie or Appiole of modern Italians, the Appia pyriformis to be the Appiolona lunga, the Syriaca ruberrima to be the red Calvetto, &c. In more modern Tuscany, Micheli describes fifty-six sorts under the Medici princes, fifty-two of which are figured by Costello.—*Journal of the Horticultural Society.*

WARDIAN CASES FOR PLANTS.

This ingenious adaptation originated with Mr. Ward, of Wellclose-square, who was led to employ these air-tight cases for the accommodation of his window-plants by the following circumstance. He had placed a chrysalis in a bottle with a little damp earth, to watch its progress towards transformation into a moth; when a fern and a grass

began to vegetate, and continued to show a healthy appearance. Thus all the requirements of nature were contained within the bottle—air, light, and moisture. Many persons have fallen into the error that Ward's cases were, or ought to be, hermetically sealed; on the contrary, a change of air is frequently necessary; this will imperceptibly occur in the closest-made cases, or they would inevitably burst. The trough to contain the earth may be made of earthenware or wood pitched inside, but the best are zinc. Bell-glasses are preferable; they are also adapted for cut flowers, which are long preserved in them. To size there are no limits, from an ounce phial even to the Crystal Palace itself. The decay of a healthy plant on transmission to a room in town is effected by the variety of gases, evaporation from dryness of air, frequent and sudden alteration of temperature, deposition of dust, soot, &c., the latter especially inimical; all these are provided against by the glass-case, while the moisture which is raised becomes condensed on the sides of the glass on occasions of change in the external temperature, accumulating and descending to the earth at the bottom, becoming more perfectly aerated and in a state better adapted for nourishing the plant. So complete is the *routine* in such a little world, in itself independent of external circumstances, that the old bottle sealed up nineteen years since is green with vegetation, though the deposits of confervæ on the inner surface disfigure its appearance. This bottle has had no fresh moisture since first closed.

THE UPAS TREE OF JAVA,

Of the poison of which so many fabulous stories have been reported, is now growing in the Horticultural Society's Garden at Chiswick, England. Notwithstanding the fables of Dutch travellers, perpetuated by Darwin, it may be approached with safety. It is, however, so virulent a poison, that no prudent person would handle it without proper precaution. "The Strychnos Tienté is the plant which yields the Upas Tienté, one of the Javanese poisons. It has been analyzed, and found to contain strychnia, and to be almost as energetic as strychnia itself. Dr. Darwin has given an account of its effects on the Javanese criminals, who used formerly to be executed by darts poisoned with the tienté. I believe the account is not very authentic; yet it accords precisely with what would be expected from the known properties of the poison."—CHRISTISON *on Poisons*.

The Upas Antiar is another Javanese poison, a bitter milky juice, which acts violently on the heart.

VARIETIES OF IVY.

Mr. Gilbert Burnett says: The Ivy, in its infant or very young state, has stalks trailing upon the ground, and protruding rootlets through their whole extent; it is spear-leaved, and it bears neither flower nor fruit: this is termed *Ivy creeping on the ground.* The same plant, when more advanced, quits the ground, and climbs walls and trees, its rootlets being holdfasts only; its leaves are generally three or five-lobed, and it is still barren: this is the *greater barren Ivy.* In its next or more mature state it disdains all props, and rising by its own strength above the walls on which it grew, occasionally puts on the appearance of a tree: in this, the flower of its age, the branches are smooth, devoid of radicles or holdfasts, and it is loaded with blossoms and fruit; the lobulations of the leaves are likewise less: this is the *war-poet's Ivy.* But when old, the ivy again becomes barren, again the suckers appear upon the stem, and the leaves are no longer lobed, but egg-shaped: this is the *Bacchanalian Ivy.*

Of the ivy Kennett (*Glossary*) tells us:—"The booths in fairs were commonly drest with ivy-leaves, as a token of wine there sold, the ivy being sacred to Bacchus; so was the tavern-bush, or frame of wood, drest round with ivy forty years since, though now left off for tuns or barrels hung in the middle of it. This custom gave birth to the present practice of putting out a green bush at the door of those private houses which sell drink during the fair; and perhaps this is all the meaning of hanging out the broom when the wife is absent, and the husband left at liberty to entertain his friends."

PLANTS IN SLEEPING-ROOMS.

There are two distinct and apparently opposite processes going on in the plant:—1. The decomposition of carbonic acid—the fixation of the carbon for the purpose of building up its own tissues—and the liberation of the oxygen. This constitutes vegetable nutrition. 2. The exhaling carbonic acid, the result of the union of the oxygen of the atmosphere with the carbon of the vegetable tissues. This is analogous to respiration. The first of these processes is not only beneficial to animal life, but absolutely essential to its existence, for as the animal inhales oxygen and exhales carbonic acid in the process of respiration, if some agency did not work out the reverse change, the whole of the oxygen in the atmosphere would be used up in a certain length of time (800,000 years, according to Professor Dumas), and animal life consequently disappear. But, as it is, animals and plants are

thus mutually dependent upon each other; and this is the case, not merely with regard to carbonic acid, but also some other compounds, such as ammonia, water, &c., which are formed in animals and decomposed in plants. So far, then, it is healthy to have plants in rooms. But there is the second process—a kind of decay, or by some looked upon as true respiration; and as this is precisely what occurs in animals, it must, of course, add to the carbonic acid of the atmosphere, and thus produce an effect prejudicial to animal life. If both these processes were carried on to the same extent, the one would, as a matter of course, counteract the other, and neither would produce either good or evil as to its effects upon the atmosphere. But as the former, under general circumstances, preponderates excessively over the latter, it is on the whole healthy to live amongst plants. There are circumstances, however, in which the respiratory process is active, and the nutritive at a stand-still, and here the influence of the vegetable upon the atmosphere will be injurious to animal life. One of these circumstances is the absence of sunshine, or daylight (as these stimuli are necessary to the carrying on the process of nutrition in the plant.) It is therefore injurious, more or less, to sleep in a room in which there are plants.

MIGRATION OF PLANTS.

Plants are seldom motionless. The wind wafts the seed of the dandelion. The waves bear the nut of the cocoa palm. Man has carried the apple and the pear, the apricot and the peach, from the highlands of Asia to the Far West. The cerealia have spread over all the world, and have become so thoroughly cosmopolite that the land of their birth is unknown. Some plants would almost seem to attach themselves to particular races. The common plaintain is called by the North American Indians "The white man's footstep." Currents of air carry seeds and the eggs of insects and infusoria. To settle this formerly disputed question, a German philosopher, Unger, placed several plates of glass, carefully cleaned, between the almost air-tight double sashes with which he protected his study against the rigors of a fierce northern climate. Six months later he took them out, and examined the dust that had fallen on them through imperceptible cracks and crevices with a microscope. The result was, that he discovered in the apparently inorganic dust the pollen of eight distinct plants, the seeds of eleven varieties of fungus, the eggs of four higher infusoria, and living individuals of at least one genus!

BLACK AND WHITE PEPPER

Are both produced from the same shrub; but, although White Pepper is sold at the highest price, it is inferior to Black. It is called Black Pepper while it is in the state of nature, covered by its external coat. White Pepper is merely Black Pepper deprived of this coat; but as the husk contains a powerful principle, it is evident that the White Pepper loses much of its stimulating property, and is inferior to the Black. The only reasonable foundation for the preference of White to Black Pepper, is the fact that the finest pepper is the young berries which fall from the trees, and are whitened by exposure to the weather; but such berries are found in small quantities, and are never exported.

THE LOTUS OF THE ANCIENTS

Is believed to be the *Nitraria tridentata* of Desfontaines, which grows in the desert of Sousa, near Tunis. It is called Damouch by the Arabs, who are aware of the semi-intoxicating qualities of its berry, much more likely to give rise to the fame of the Lotus than the dry and unpleasant fruit of the *Zizyphus Lotos*, or that of the *Celtis australis*, to which the infatuating food of the *Lotophagi* has been in turn referred.—*Annals of Nat. History*, 1847.

THE HYSSOP OF SCRIPTURE.

Dr. Royle, F. A. S., after an elaborate investigation of the speculations of various writers on this subject, concludes the Hyssop to be the caper-tree, the *Capparis spinosa* of Linnæus, which is abundant in the south of Europe, on the islands and coasts of the Mediterranean, in Lower Egypt and in Syria.

TOBACCO.

Forty different species of Tobacco are described by botanists. It was introduced into France by Nicot in 1560, and into England by Sir Walter Raleigh in 1586. John Aubrey tells us "Sir Walter Long, who was intimate with Sir Walter Raleigh, was the first who brought the use of tobacco into the northern parts of England. In these days, they (meaning the gentlemen) had silver pipes. The ordinary sort made use of a walnut shell and a strawe. I have heard my grandfather Lyte say, one pipe was handed from man to man round the table. Within these 35 years, 'twas scandalous for a divine to take tobacco. It was sold then for its wayte in silver. I have heard some

of our old yeomen neighbours say that when they went to Malmesbury or Chippenham, they culled their biggest shillings to lay in the scales against the tobacco."

It would appear, by King James's celebrated *Counterblast*, that in the short space of thirty years the practice of smoking had become surprisingly common in England, and that large sums were expended upon it, some lavishing three and some four hundred pounds per annum upon this "precious stinke," which his Majesty grotesquely stigmatizes as "a custome loathsome to the eye, hateful to the nose, harmfull to the braine, dangerous to the lungs, and in the blacke stinking fume thereof neerest resembling the horrible Stigian smoake of the pit that is bottomlesse." Notwithstanding the *Counterblast*, the consumption in England went on increasing; and probably tobacco is now, next to salt, the vegetable product most generally consumed by man, there being no climate in which it is not used, no nationality which has not adopted it. The total annual production is estimated at 2,000,000 of *tons*.

The comparative magnitude of this 2,000,000 tons will strike the reader more forcibly when we state that the whole of the wheat consumed by the inhabitants of Great Britain—estimating it at a quarter per head, or in round numbers at 20,000,000 quarters—weighs only four and one-third millions of tons; so that the tobacco yearly raised for the gratification of this one form of the narcotic appetite weighs as much as the wheat consumed by 10,000,000 Englishmen.

HOW TO ARRANGE FLOWERS IN A GARDEN.

The Cavendish Society recommend blue flowers to be placed next to orange, and the violet next to the yellow; whilst red and pink flowers are never seen to greater advantage than when surrounded by verdure and by white flowers; the latter may also be advantageously dispersed among groups of blue and orange, and violet and yellow flowers. Plants whose flowers are to produce a contrast should be of the same size, and in many cases the color of the sand or gravel walks or beds of a garden should be made to conduce to the general effect.

COTTON.

The word *Cotton* has been adopted in modern European languages from the Arabic word meaning the same article, and which, when put into English letters, would be pronounced *kotun;* in Egypt it is called *gotun*. The Spanish word *algodon* is evidently the Egypto-Arabic

word, with the *al* prefixed. The Germans, who generally avoid intercalating into their language words of foreign origin, call it *baum-wolle*, *i. e.* tree-wool.—*Arthur Akin.*

NANKIN COTTON.

The yellowish-brown color of Chinese nankins is the natural tint of the cotton, and is not imparted by dyeing. The name is derived from the city of Nankin, to which place the manufacture of these cotton-stuffs was once peculiar.

RESPIRATORY ORGANS OF VEGETATION.

The number and activity of the little mouths which stud the leaf are very wonderful. On a single square inch of the leaf of the common lilac as many as 120,000 have been counted; and the rapidity with which they act is so great, that a thin current of air passing over the leaves of an actively-growing plant is almost immediately deprived by them of the carbonic acid it contains.—JOHNSTON'S *Chemistry of Common Life.*

FOOD OF THE MASTODON.

Prof. Asa Gray stated that he had recently had placed in his hands specimens of earthy matter, filled with finely broken fragments of branches of trees, which were found in the skeleton of a mastodon exhumed at Schooley's Mountain, N. J. The wood evidently consisted of branchlets of one, two and three years old, broken, quite uniformly, into bits of half an inch or so in length, with only now and then traces of the bark remaining on the wood. The wood was not at all fossilized, and was but slightly decayed. From the appearance of the branchlets examined, Prof. Gray inferred that they belonged to some coniferous tree or shrub, and probably to a kind of spruce fir, rather than to a true pine. This inference was borne out by the examination of thin slices of the wood by the microscope. The woody fibre was very beautifully and distinctly marked with the circular discs that are characteristic of all coniferous wood. The structure agreed quite perfectly with that in similar branchlets of the common hemlock spruce. —SILLIMAN'S *Journal.*

BLOOD RAIN.

During the first Great Plague of Rome, in the reign of Romulus, we read in Plutarch that it seemed to *rain blood;* a portent which in ages of barbarism has not been unfrequently recorded. Now the red

fungus which presents this appearance has been found to be the concomitant of epidemics in more modern times also, as well as during the continental sweating sickness at Cremona in 1529. Hecker, in his *History of Epidemics*, cites various other instances of the same phenomenon co-existing with some great epidemic; and remarks, that blood-spots, as they were called, went for that reason by the name of *signacula*. They were observed in the plague of the sixth century, and during those of 789 and 959 were called *Lepra Vestium*. In the plague of 1500 and 1503 this phenomenon caused great alarm, more especially as the sign of the cross would be recognized in these blood-spots. One of the first persons who considered the thing at all scientifically was George Agricola, who in the *History of the Plague* that occurred in his day (sixteenth century), pronounced the spots to be caused by a lichen. With its occurrence was connected a great failure of the crops, which is often consequent on the abundance of fungi.—Dr. Daubeny, F. R. S.

THE INFUSORIA OF DUST-SHOWERS AND BLOOD-RAINS.

The infusorial character of the dust occasionally transported by winds is one of the most wonderful of Ehrenberg's discoveries. His investigations have been reported from time to time since 1844, but a recent publication contains the details of all his researches, with full illustrations. The plates contain not only the figures of all the forms observed in each case, but a sketch of a portion of the dust as it lay under the microscope, exhibiting to the eye the relative prevalence of different forms, and the colors they presented. Ehrenberg favors the view of the atmospheric origin of these showers, and speaks of their relation to the fall of meteorites. Chaldini, in his work on meteorites, observes that the stones which fell between 1790 and 1819 amounted to not less than 600 weight; while from the single dust-shower of Lyons, in 1846, the material that fell was full 7,200 weight. The Cape de Verde shower of 1834 had a breadth, according to Darwin, of more than 1,600 miles, and extended from 800 to 1,000 miles from the African coast. This gives an area of 960,000 to 1,648,000 square miles. The surface of Italy and Sicily is about 100,000 square miles; a single dust-shower covering both these countries, like that of 1803, or of Lyons in 1846, would deposit 112,800 weight of dust in a single day. With such facts before us Ehrenberg asks, how many thousand million of hundred weight of microscopic organisms have fallen since the period of our earliest record of such events? He adds, "I can no longer doubt, that there are relations, according to which

living organisms may develop themselves in the atmosphere;" and he speaks of this as a self-development, and not a production from introduced ova. He supposes it probable that the atmospheric dust-cloud region is of vast extent, and is above a height of 14,000 feet. These facts may seem inexplicable on any other hypothesis: yet much more investigation will be required before an opinion, so contrary to received principles, can be generally adopted. The number of dust-showers which Ehrenberg records is in all 340; 81 before the Christian era, 249 after. The first instance he adduces, is the Plague of Blood inflicted upon the Egyptians, as related in the Mosaic history, which continued throughout all the land of Egypt for three days and three nights. The second occurred about 1181, B. C., in the time of Æneas and Dido, as related by Virgil, (Æneid, iv. 454). Many other instances of subsequent date are also recorded, the information respecting which is not of as doubtful a character as with those referred to before the Christian era. Ehrenberg remarks that these showers appear to prevail most within a zone extending from the part of the Atlantic off the west coast of Middle and North Africa, along in the direction of the Mediterranean Sea, reaching a short distance north of this sea, and continuing into Asia between the Caspian Sea and the Persian Gulf. They seldom reach north as far as Russia and Sweden. This zone, in the North Torrid Zone, has a breadth of 1800 miles. The reddish color of the dust, as well as the organic forms, show that the dust is not of African origin. Moreover the storm-winds and Sirocco are found to afford the same species or organisms. The whole number of species of organisms observed is 320. A simultaneous occurrence of dust-showers and falls of meteoric stones has been observed in probably eighteen instances before the Christian era. During the Christian era, fourteen coincidences have been observed, making thirty-two in all.

VITALITY OF SEEDS.

Prof. Henslow states to the British Association that during 1850, he planted several seeds sent to the committee appointed to report on this subject, and out of those he had planted two had grown. They both belonged to the order of *Leguminosæ*, and one was produced from seed seventeen, and the other from seed twenty, years old. On the whole, it appeared that the seeds of *leguminosæ* retained their vitality longest. Tournefort had recorded an instance of beans growing after having been kept a hundred years, and Willdenow had observed a sensitive plant to grow from seed that had been kept sixty years.

The instances of plants growing from seeds found in mummies were all erroneous. So also were the cases related by Dr. Lindley, of a raspberry-bush growing from seed found in the inside of a man buried in an ancient barrow. Mr. Babington related a case in which M. Fries, of Upsala, succeeded in growing a species of Hieracium from seeds which had been in his herbarium upwards of fifty years. Desmoulines recorded an instance of the opening of some ancient tombs in which seed was found, and on being planted they produced species of scabiosa and heliotropium. Recently some seeds from Egypt were sown in Cambridge, which were thought to have germinated; but on examining them they were covered with a pitchy substance, which had evidently been applied subsequent to their germination, and thus they had preserved the appearance of growth through a long period of time.

NECESSITY OF PROPER MENTAL EMPLOYMENT AND RELAXATION.

Not a few persons who abandon their employments under the impression that they will be happy in doing so, actually die of ennui. It induces bodily disease more than physical or mental labor. Others, indeed, survive the ordeal. But, where the body does not suffer, the mind often does. I have known instances of persons whose habits have been suddenly changed from those of great activity to those of no employment at all, who have been for a time in a state of mental excitement or hypochondriasis, bordering on mental aberration. Moreover, it is with the mind as it is with the body—it is spoiled from want of use; and the clever and intelligent young man, who sits down to lead what is called a life of leisure, invariably becomes a stupid old man.

A man in a profession may be engaged in professional matters for twelve or fourteen hours daily, and suffer no very great inconvenience beyond that which may be traced to bodily fatigue. The greater part of what he has to do (at least it is so after a certain amount of experience) is nearly the same as that which he has done many times before, and becomes almost matter of course. He uses not only his previous knowledge of facts or his simple experience, but his previous thoughts, and the conclusions at which he had arrived formerly; and it is only at intervals that he is called upon to make any considerable mental exertion. But at every step in the composition of his philosophical works Lord Bacon had to think; and no one can be engaged in that which requires a sustained effort of thought for more than a very limited portion of the twenty-four hours. Such an amount of that

kind of occupation must have been quite sufficient even for so powerful a mind as that of Lord Bacon. Mental relaxation after severe mental exertion is not less agreeable than bodily repose after bodily labor. A few hours of *bona fide* mental labor will exhaust the craving for active employment, and will leave the mind in a state in which the subsequent leisure (which is not necessarily mere idleness) will be as agreeable as it would have been irksome and painful otherwise.—Sir Benjamin Brodie.

HOW FAR MAY INSANITY EXTENUATE THE GUILT OF CRIME.

The law makes a reasonable allowance for the subsiding of passion suddenly provoked. But we are not, therefore, to presume that the same allowance is to be made for those in whom a propensity to set fire to their neighbors' houses, or commit murder, is continued for months, or weeks, or even for hours. Is it true that such persons are really so regardless of the ill consequences which may arise, so incapable of the fear of punishment, and so absolutely without the power of self-restraint, as they have been sometimes represented to be? If not, there is an end of their want of responsibility. Let me refer here to the instance of the gouty patient. . . . . . Under the influence of his disease, every impression made on his nervous system is attended with uneasy sensations. If such a person has exerted himself to acquire the habit of self-control, the evil ends with himself; but otherwise he is fractious and peevish; flies into a passion, without any adequate cause, with those around him, and uses harsh words which the occasion does not justify; conduct of which he can offer to himself no explanation, except that he cannot help it; and for which, if he be a right-minded person, he is sorry afterwards. If he were to yield to the impulse of his temper so far as to inflict on another a severe bodily injury, ought it to be admitted as an excuse that we have examined his blood, and found in it too large a proportion of lithic acid?

It seems to me that juries have not unfrequently been misled by the refinements of medical witnesses, who, having adopted the theory of a purely moral insanity, have applied that term to cases to which the term insanity ought not to be applied at all. It is true that the difference in the character of individuals may frequently be traced to difference in their organizations, and to different conditions as to bodily health; and that, therefore, one person has more, and another has less difficulty in controlling his temper and regulating his conduct. But we all have our duties to perform, and one of the most important

of these is, that we should strive against whatever evil tendency there may be in us arising out of our physical constitution.

We have been told of a very eminent person who had acquired the habit of touching every post that he met with in his walks, so that at last it seemed to be a part of his nature to do so; and that if he found that he had inadvertently passed by a post without touching it, he would actually retrace his steps for the purpose. I knew a gentleman who was accustomed to mutter certain words to himself (and they were always the same words), even in the midst of company. He died at the age of ninety, and I believe that he had muttered these words for fifty or sixty years.

These were foolish habits; but they might have been mischievous. To correct them at last would have been a very arduous undertaking. But might not this have been easily done in the beginning? And if so—if, instead of touching posts, or uttering unmeaning words, these individuals had been addicted to stealing or stabbing—ought they to have been absolved from all responsibility? It has been observed by a physician who has had large opportunities of experience on these matters, that "a man may allow his imagination to dwell on an idea until it acquires an unhealthy ascendency over his intellect." And surely, if, under such circumstances, he were to commit a murder, he ought to be held as a murderer, and would have no more claim to be excused than a man who has voluntarily associated with thieves and murderers until he had lost all sense of right and wrong; and much less than one who has had the misfortune of being born and bred among such malefactors.—SIR BENJ. BRODIE.

TEST FOR INSANITY.

The difficulty of *recalling* a train of thought is, I believe, one of the invariable accompaniments of insanity, for it is an act in which both brains are concerned. Shakspeare, who seems to have known by a kind of intuition what it takes other men enormous mental labor to acquire, makes Hamlet say—

> ——'bring me to the test,
> And I the matter will reward, which madness
> Would gambol from.'

I cannot remember to have seen a single instance of insanity, however slight, and however incognizable by any but an experienced medical man, where the patient, after relating a short history of his complaints, physical, moral, or social, could, on being requested to repeat the narrative, follow the same series; to repeat the same words, even with

the limited correctness of a sane person, is, I believe, always impossible in the very mildest case of insanity. The point where this inability begins, however difficult to ascertain exactly, has always seemed to me the point at which strict responsibility for our actions ceases, and the exercise of restraint by others becomes a right and a duty.—WIGAN *on Insanity.*

CONNECTION OF THE BRAIN WITH OUR MENTAL FACULTIES.

If we investigate the condition of the various orders of vertebrate animals, which alone admit of a comparison with our own species, we find, on the one hand, great differences among them, with regard to both their physical and mental faculties, and on the other hand a not less marked difference as to the structure of their brain. In all of them the brain has a central organ, which is a continuation of the spinal chord, and to which anatomists give the name of *medulla oblongata.* In connection with this, there are other bodies placed in pairs, of a small size and simple structure in the lowest species of fish, becoming gradually larger and more complex as we trace them through the other classes, until they reach their greatest degree of development in man himself. That each of these bodies has its peculiar functions, there cannot, I apprehend, be the smallest doubt; and it is, indeed, sufficiently probable that each of them is not a single organ, but a congeries of organs, having distinct and separate uses.

There is reason to believe that, whatever it may do besides, one office of the *cerebellum* is to combine the action of the voluntary muscles for the purpose of locomotion. The *corpora quadrigemina* are four tubercles, which connect the *cerebrum*, *cerebellum*, and *medulla oblongata* to each other. If one of the uppermost of these bodies be removed, blindness of the eye of the opposite side is the consequence. If the upper part of the *cerebrum* be removed, the animal becomes blind and apparently stupefied; but not so much so but that he may be roused, and that he can then walk with steadiness and precision. The most important part of the whole brain seems to be a particular portion of the central organ *medulla oblongata.* While this remains entire, the animal retains its sensibility, breathes, and performs instinctive motions. But if this small mass of the nervous system be injured, there is an end of these several functions, and death immediately ensues. These facts, and some others of the same kind, for a knowledge of which we are indebted to modern physiologists, and more especially to M. Magendie and M. Flourens, are satisfactory as far as they go, and warrant the conclusion that there are various other organs in the brain,

designed for other purposes, and that if we cannot point out their locality, it is not because such organs do not exist, but because our means of research into so intricate a matter are very limited.

THE TERM "NERVOUS."

There are few terms more commonly used, both in and out of the medical profession, than "Nervous:" it is a word which has acquired great numbers of significations, and many people, at the same time, profess not to understand what it means. Certainly, to speak of "being nervous," is a mode of expression which is very indefinite, from the use that is made of it; but which, if properly applied, carries to the mind a very forcible impression of a peculiar state, for which we have no very appropriate language. Unfortunately, the same word has been long employed to express two states in direct opposition to each other: thus, we talk of strong, weighty argument, delivered with boldness and energy, and in appropriate language—as "a nervous speech," and the orator as "full of nerve;" whilst we, on the other hand, say, that the individual who delivers himself with timidity, with hesitation, and distrust of his own power, is "highly nervous;"—we regret that his "good sense was overpowered by his nerves." In the first instance, we mean to say that there is a tension and strength of nerve; in the latter, that there is a laxity and weakness of nerve; yet, by some strange anomaly in our mode of expressing our ideas, we apply the same adjective to both these states of the nervous system.

INSENSIBILITY OF THE BRAIN.

Sensibility is, in reality, very different from what is suggested by first experience. Thus, the brain is insensible: that part of the brain which, if disturbed or diseased, takes away consciousness, is as insensible as the leather of our shoe! That the brain may be touched, or a portion of it cut off, without interrupting the patient in the sentence he is uttering, is a surprising circumstance! This informs us that sensibility is not a necessary attendant on the delicate texture of a living part, but that it must have an appropriate organ, and that it is an especial provision.—Bell's *Bridgewater Treatise.*

FALSITY OF PHRENOLOGY.

Now there are two simple anatomical facts which the founders of phrenology have overlooked, or with which they were probably unacquainted, and which of themselves afford a sufficient contradiction of

it. 1st. They refer the mere animal propensities chiefly to the posterior lobes, and the intellectual faculties to the anterior lobes of the cerebrum. But the fact is, that the posterior lobes exist only in the human brain and in that of some of the tribe of monkeys, and are absolutely wanting in quadrupeds. Of this there is no more doubt than there is of any other of the best-established facts in anatomy. 2dly. Birds have various propensities and faculties in common with us, and in the writings of phrenologists many of their illustrations are derived from this class of vertebral animals. But the structure of the birds' brain is essentially different, not only from that of the human brain, but from that of the brain of the mammalia generally. It is plain that there can be no phrenological organs in the birds' brain corresponding to those which are said to exist in the human brain, or in that of other mammalia. Yet birds are as pugnacious and destructive, as much attached to the localities in which they reside, and as careful of their offspring as any individual among us; and I suppose that no one will deny that if there be special organs of tune or of imitation in man, such organs ought not to be wanting in the bull-finch and parrot.—Sir Benjamin Brodie's *Psychological Inquiries.*

THE AMOUNT OF SLEEP WE NEED.

We may, therefore, fairly ask, what is the quantity of sleep which a reasonable man should be contented with? This is a somewhat difficult question. Tall and bulky people require more sleep than short and thin people; men than women, and all animals sleep longer in winter than in summer. Age, constitution, climate, occupation, and a variety of incidental causes must be taken into consideration. In extreme old age much sleep is required. Youth and young adults sleep habitually very soundly. The faculty of remaining asleep longer than is necessary cannot be indulged in without impairing the strength both of the body and mind. In a state of health the amount of sleep required to restore the nervous energy averages, we conceive, from six to eight hours.

POSITION IN SLEEPING.

It is better to go to sleep on the right side, for then the stomach is very much in the position of a bottle turned upside down, and the contents are aided in passing out by gravitation. If one goes to sleep on the left side, the operation of emptying the stomach of its contents is more like drawing water from a well. After going to sleep, let the body take its own position. If you sleep on your back, especially soon

after a hearty meal, the weight of the digestive organs, and that of the food, resting on the great vein of the body, near the back bone, compresses it, and arrests the flow of the blood more or less. If the arrest is partial, the sleep is disturbed, and there are unpleasant dreams. If the meal has been recent or hearty, the arrest is more decided, and the various sensations, such as falling over a precipice, or the pursuit of a wild beast, or other impending danger, and the desperate effort to get rid of it, arouses us; that sends on the stagnating blood, and we wake in a fright, or trembling, or perspiration, or feeling of exhaustion, according to the degree of stagnation, and the length and strength of the effort made to escape the danger. But when we are not able to escape the danger, when we do fall over the precipice, when the tumbling building crushes us, what then? *That is Death!* That is the death of those of whom it is said, when found lifeless in their beds in the morning, "They were as well as they ever were, the day before;" and often is it added, "and *ate heartier than common!*" This last, as a frequent cause of death to those who have gone to bed well to wake no more, we give merely as a private opinion. The possibility of its truth is enough to deter any rational man from a late and hearty meal. This we do know with certainty, that waking up in the night with painful diarrhœa, or cholera, or bilious colic, ending in death in a very short time, is properly traceable to a late large meal. The truly wise will take the safer side. For persons who eat three times a day, it is amply sufficient to make the last meal of cold bread and butter and a cup of some warm drink. No one can starve on it, while a perseverance in the habit soon begets a vigorous appetite for breakfast, so promising of a day of comfort.—HALL's *Journal.*

HYPNOLOGY; OR, HOW TO PROCURE SLEEP.

Dr. Binns, in his *Anatomy of Sleep*, recommends the following means of procuring rest. Let the person turn on his left side, place his head comfortably on the pillow, so that it exactly occupies the angle a line from the head to the shoulder should form; and then, slightly closing his lips, let him take rather a full respiration, breathing as much as he possibly can through the nostrils. Having taken a full inspiration, the lungs are then to be left to their own action, that is, the respiration is neither to be accelerated nor retarded. The patient should then depict to himself that he sees the breath passing from his nostrils in a continuous stream; and the very instant that he brings his mind to conceive this apart from all other ideas, consciousness and

memory depart, imagination slumbers, fancy becomes dormant, thought subdued, the sentient faculties lose their susceptibility, the vital or ganglionic system assumes the sovereignty, and he no longer wakes, but sleeps. This train of phenomena is but the effect of a moment. The instant the mind is brought to the contemplation of a single sensation, the sensorium abdicates the throne, and the hypnotic faculty steeps it in oblivion.

NIGHTMARE.

I may here refer to the state of mind during what is popularly termed "the nightmare." In this case sleep is imperfect. We are to a certain extent aware of our situation. We know where we are, but we feel as if some power oppressed us, and prevented our moving our limbs. The fact is, not that the muscles will not obey the will, but that the will itself is not exercised. The paralysis and catalepsy of hysterical patients is of the same kind, and both the one and the other immediately vanish if a strong impression be made on the senses, or even on the imagination.—Sir Benjamin Brodie's *Psychological Inquiries.*

SLEEP OF AGED PERSONS.

The wakefulness common to old people is by no means so great an affliction as certain persons imagine it to be. "They use but little exertion, and hence require but little sleep; and the internal activity is upon a par with the external. A third part of the vessels perhaps that took a share in the general energy of the middle life is obliterated; and the wear and tear of those that remain are much less. The pulse beats feebly; the muscles of respiration are less forcibly distended; the stomach digests a smaller portion of food—for only a smaller portion is required; the intellect is less active, the corporeal senses less lively; and hence, though there is far more weakness than in earlier life, there is a less proportionate demand for exertion, and hence a far smaller necessity for sleep."

DREAMS.

Lord Brougham has been inclined to the opinion that we never dream except while in the state of transition from being asleep to being awake. But I own that this seems to me to be a mistake. First, there is no sufficient proof of it being so; and secondly, we have a proof of the contrary in the fact, that nothing is more common than for persons to moan, and even talk in their sleep without awaking

from it. Even in the case of a dog, who is sleeping on the rug before the fire, if you watch him, you can scarcely doubt that he is sometimes dreaming, though he still remains asleep. I should, myself, be more inclined to doubt whether we ever sleep without some degree of dreaming. At any rate, not to dream, seems to be, not the rule, but the exception to the rule; for it rarely happens that we awake without being sensible of some time having elapsed since we fell asleep; which is in itself a proof that the mind has not been wholly unoccupied. That on such occasions we have no distinct recollection of our dreams, proves nothing. Referring again to the instance of persons who talk in their sleep, we often find that they have not the smallest recollection of their having dreamed afterwards. It is only those dreams which affect us very strongly, and which occur immediately before we awake from sleep, that we really remember; and even of these, the impression is not in general sufficient for us to retain it for more than a very few minutes. If a dream be remembered longer, it is only because we have thought of it after it occurred, and have thus given it a place in our memory, which it could not have obtained otherwise.—SIR BENJAMIN BRODIE'S *Psychological Inquiries.*

DEATH BY COLD.

The immediate cause of death by cold is apoplexy. The heart is arrested and paralyzed in the exercise of its office, and no longer supplies the brain with arterial blood. Nor is the blood thrown with sufficient force to the extremities. It accumulates, therefore, in the large vessels proceeding immediately from the main spring, and there is no ingress for the blood returning from the brain. The large sinuses, therefore, become overgorged, and apoplexy follows.

When the cold has not been severe enough to destroy life entirely, it mutilates the extremities, and mortification ensues from a want of circulation. The Lascars, who arrive in this country from India in the winter season, are very prone to this effect of a climate so much colder than their native one, as the records of the city hospitals abundantly prove.—SIR HENRY HALFORD.

SUFFERINGS OF THE DEATH-BED.

The circumstance which has given rise to our notions respecting the sufferings of our last moments is, that in certain diseases there is a convulsive action of the muscles at the time at which the sensibility is extinguished. But these are not acts of volition. The laws of our

nature tell us that they are not the effects of suffering; and we never see in the patient any indication that he suffers. Were they indications of a struggle of feeling, necessarily connected with the last act of dying, as has been supposed, they would be a constant symptom; whereas, they only occur under certain circumstances of the constitution or the disease. One of the least painful of violent deaths is that from loss of blood; yet here this struggle very uniformly attends the last act of dying, according to the common acceptation of the term; and it is evident that here the sensibility, in consequence of the failure of circulation, is almost extinguished before this involuntary action of the muscles takes place. The struggles, therefore, the laborious and convulsive heavings of the chest, are wholly automatic (or mechanical), independent of the will,—a part of the mechanism of the body, contrived for its safety, which continues to act when the mind is unconscious of the sufferings of the frame, or is occupied by soothing illusions.

DEATH—AND THE FEAR OF IT.

According to my observation, the mere act of dying is seldom, in any sense of the word, a very painful process. It is true that some persons die in a state of bodily torture, as in cases of tetanus: that the drunkard, dying of *delirium tremens*, is haunted by terrific visions; and that the victim of that most horrible of all diseases, hydrophobia, in addition to those peculiar bodily sufferings from which the disease has derived its name, may be in a state of terror from the supposed presence of frightful objects, which are presented to him as realities, even to the last. But these and some other instances which I might adduce, are exceptions to the general rule, which is, that both mental and bodily suffering terminate long before the scene is finally closed. Then as to the actual fear of death; it seems to me that the author of our existence, for the most part, gives it to us when it is intended that we should live, and takes it away from us when it is intended that we should die. I have, myself, never known but two instances in which, in the act of dying, there were manifest indications of the fear of death. The two individuals to whom I allude, were unexpectedly destroyed by hæmorrhage, which, from peculiar circumstances, it was impossible to suppress. The depressing effects which the gradual loss of blood produced on their corporeal system, seemed to influence their minds, and they died earnestly imploring that relief which art was unable to afford. Seneca might have chosen an easier death than that from opening his arteries.—Sir Benjamin Brodie's *Psychological Inquiries*.

Professor Hufeland observes, in his work on Longevity, that "many fear death less than the operation of dying. People form the most singular conception of the last struggle, the separation of the soul from the body, and the like. No man certainly ever felt what death is; and as insensibly as we enter into life, equally insensibly do we leave it. My proofs are as follow: First, man can have no sensation of dying; for, to die, means nothing more than to lose the vital power; and it is the vital power which is the medium of communication between the soul and body. In proportion as the vital power decreases, we lose the power of sensation and of consciousness; and we cannot lose life without at the same time, or rather before, losing our vital sensation, which requires the assistance of the tenderest organs. We are taught also by experience, that all those who ever passed through the first stage of death, and were again brought to life, unanimously asserted that they felt nothing of dying, but sunk at once into a state of insensibility.

"Let us not be led into a mistake by the convulsive throbs, the rattling in the throat, and the apparent pangs of death, which are exhibited by many persons when in a dying state. These symptoms are painful only to the spectators, and not to the dying, who are not sensible of them. The case here is the same as if one, from the dreadful contortions of a person in an epileptic fit, should form a conclusion respecting his internal feelings: from what affects us so much he suffers nothing."

PHENOMENA OF THE DEATH-BED.

Whatever be the causes of dissolution, whether sudden violence or lingering malady, the immediate modes by which death is brought about appear to be but two. In the one, the nervous system is primarily attacked, and there is a sinking, sometimes an instantaneous extinction, of the powers of life; in the other, dissolution is effected by the circulation of black venous blood instead of the red arterial blood. The former is termed death by syncope, or fainting; the latter, death by asphyxia. In the last-mentioned manner of death, when it is the result of disease, the struggle is long, protracted, and accompanied by all the visible marks of agony which the imagination associates with the closing scene of life,—the pinched and pallid features, the cold clammy skin, the upturned eye, and the heaving laborious, rattling respiration. Death does not strike all the organs of the body at the same time: some may be said to survive others; and the lungs are the last to give up the performance of their function, and die. As death

approaches, they become gradually more and more oppressed; the air-cells are loaded with an increased quantity of the fluid which naturally lubricates their surfaces; the atmosphere can now no longer come into contact with the minute blood-vessels spread over the air-cells, without first permeating this viscous fluid,—hence the rattle; nor is the contact sufficiently perfect to change the black venous into the red arterial blood; an unprepared fluid consequently issues from the lungs into the heart, and is thence transmitted to every other organ of the body. The brain receives it, and its energies appear to be lulled thereby into sleep,—generally tranquil sleep,—filled with dreams which impel the dying lip to murmur out the names of friends, and the occupations and recollections of past life: the peasant "babbles o' green fields;" and Napoleon expires amid visions of battle, uttering with his last breath, "*tête d'armée.*"—Sir Henry Halford.

DEATH NOT PAIN.

Death and pain are inseparable in most men's minds; yet, in a recent communication to the Royal Society, Dr. Philip stated, that death, under its various forms, whether arising from old age, excessive stimulants producing exhaustion, debilitating causes that weaken vital action, injury or disease of vital organs, is always preceded by a loss of sensibility, so that the precise action we properly call death is one unattended with pain. This is proved by the experience of those who have been recovered after submersion or strangulation; for they all agree that no pain was felt when the vital actions were suspended, but that acute pain attended their first sensations of returning life. Death, then, is simply the loss of sensibility. This reminds one of the saying of Arcesilaus, that "Death, of all estimated evils, is the only one whose presence never incommoded anybody, and which only caused concern during its absence."

UNCERTAIN SIGNS OF DEATH.

The cessation of pulsation in the heart and the arteries, and coldness of the body, are commonly thought to be certain signs of death; but the researches of science have proved them to be very fallacious. A more certain sign is the suspension of respiration, for it cannot be continued many minutes without actual death supervening; whereas the action of the heart and arteries may be suspended for a considerable time, if respiration be still carried on, however obscurely, and yet these organs be again awakened to activity. The first object, therefore, in supposed death, is to ascertain whether respiration still contin-

ues. This can, in many instances, be perceived by baring the thorax and abdomen; since it is impossible for breathing to be carried on for many seconds without the influence of the respiratory muscles, the effect of the action of which is to elevate the ribs and depress the diaphragm, so as to push forward the sternum, and cause a momentary swelling of the abdomen. It is of great importance to the young practitioner to accustom his eye to judge accurately of these movements, as the ordinary methods of applying a mirror to the mouth, or a downy feather near it, are both liable to error. If the mirror be warmer than the expired breath, no sign can be obtained by it, because the breath is not condensed upon it; or, the insensible perspiration from the hand of him who holds it may sully its surface; whilst "the light and weightless down," is very liable to deceive.

Another symptom, the opacity and want of lustre in the eye, is equally fallacious; even the thin slimy membrane which covers the cornea in the eye of the dead, which breaks in pieces when touched, and is easily removed from the cornea by wiping, sometimes is formed many hours before death has occurred. In several instances, also, this appearance does not present itself even after death; as, for instance, in cases of poisoning by hydrocyanic acid, in which the eye retains all its lustre for hours after death; and the iris even contracts when approached by a bright light. This sign, therefore, when taken alone, is of no value.

The state of collapse, which is one of the symptoms of cholera asphyxia, has demonstrated how little is the value of *coldness* of the body as a sign of death. In that singular disease, the coldness which accompanies the state of collapse is that of ice, and during it no pulsation can be perceived, even at the heart; yet the person lives and breathes, and frequently recovers. Drowned persons also, in whom animation is only suspended, and who may be recalled to life, are always cold; whereas in some diseases, apoplexy for example, a certain degree of warmth is perceived for many hours.

Paleness and lividity of countenance always accompany the above state of collapse; the body even becomes blue: this sign, therefore, which is usually set down as one indicating death, is of less value than any others. Cases, on the other hand, have occurred in which the countenance has remained unchanged a considerable time after death; and in some instances, as Dr. Paris has remarked, "its color and complexion have not only been preserved, but even heightened;" as if the spirit, scorning the blow which severed it from mortality, had left the smile it raised upon the moveless features.

From these, and other observations, by the same writer, Dr. A. T. Thomson, it is evident that there are no certain signs that a person is truly dead, except the total cessation of respiration and the commencing putrefaction of the body.

PECULIARITIES IN THE HAND.

Nothing is more remarkable, as forming a part of the prospective design to prepare an instrument fitted for the various uses of the Human Hand, than the manner in which the delicate and moving apparatus of the palm and fingers is guarded. The power with which the hand grasps, as when a sailor lays hold of the rope to raise his body in the rigging, would be too great for the texture of mere tendons, nerves, and vessels; they would be cracked were not every part that bears the pressure defended with a cushion of fat, as elastic as that which is in the foot of the horse and the camel. To add to this purely passive defence, there is a muscle which runs across the palm, and more especially supports the cushion on its inner edge; it is this muscle which, raising the edge of the palm, adapts it to lave water, forming the cup of Diogenes. In conclusion, what says Ray? "Some animals have horns, some have hoofs, some teeth, some talons, some claws, some spurs and beaks; man hath none of all these, but is weak and feeble, and sent unarmed into the world;—why, a hand, with reason to use it, supplies the use of all these!"—Sir Charles Bell, *on the Hand.*

CAUSES OF LEFT-HANDEDNESS.

The question has been much discussed among anatomists, whether the properties of the right hand, in comparison with those of the left, depend on the course of the arteries to it. It is affirmed that the trunk of the artery going to the right arm passes off from the heart, so as to admit the blood directly and more forcibly into the small vessels of the arm. This is assigning a cause which is unequal to the effect, and presenting, altogether, too confined a view of the subject: it is a participation in the common error of seeking in the mechanism the cause of phenomena which have a deeper source.

For the conveniences of life, and to make us prompt and dexterous, it is pretty evident that there ought to be no hesitation which hand is to be used, or which foot is to be put forward; nor is there, in fact, any such indecision. It must be observed that there is a distinction in the whole right side of the body, and that the left side is not only the weaker, in regard to muscular strength, but also in its

vital or constitutional properties. The development of the organs of action and motion is greatest upon the right side, as may at any time be ascertained by measurement, or the testimony of the tailor or shoemaker; certainly, this superiority may be said to result from the more frequent exertion of the right hand; but the peculiarity extends to the constitution also; and disease attacks the left extremities more frequently than the right. In opera-dancers, we may see that the most difficult feats are performed by the right foot. But their preparatory exercises better evince the natural weakness of the left limb, since these performers are made to give double practice to this limb, in order to avoid awkwardness in the public exhibition; for if these exercises be neglected, an ungraceful performance will be given to the right side. In walking behind a person, it is very seldom that we see an equalized motion of the body; and if we look to the left foot, we shall find that the tread is not so firm upon it, that the toe is not so much turned out as in the right, and that a greater push is made with it. From the peculiar form of woman, and the elasticity of her step resulting more from the motion of the ankle than of the haunches, the defect of the left foot, when it exists, is more apparent in her gait. No boy hops upon his left foot, unless he be left-handed. The horseman puts his left foot in the stirrup, and springs from the right.

We think we may conclude that every thing being adapted, in the conveniences of life, to the right hand—as for example, the direction of the worm of the screw, or of the cutting end of the auger—is not arbitrary, but is related to a natural endowment of the body. He who is left-handed is most sensible to the advantages of this adaptation, from the opening of a parlor door to the opening of a penknife. On the whole, the preference of the right hand is not the effect of habit, but is a natural provision, and is bestowed for a very obvious purpose; and the property does not depend on the peculiar distribution of the arteries of the arm, but the preference is given to the right foot as well as to the right hand.—BELL's *Bridgewater Treatise.*

RESPIRATION AND VENTILATION.

It may be generally noticed, that every fifth or sixth inspiration in man is longer and fuller than the rest. Their number varies according to age, and to the state of the nervous system; being faster in infants and young persons, than in adults; and more rapid in states of mental excitement, or irritation of the bodily system, than in a tranquil con-

dition. In general, from 14 to 18 inspirations take place every minute in an adult; but the number becomes greater, if the attention of the person, whose respirations are being counted, is directed to it. The average quantity of air taken in at each inspiration, seems to be about 20 cubic inches; so that, reckoning 16 inspirations to take place per minute, nearly 20,000 cubic inches pass through the lungs in an hour, and 460,224 cubic inches, or 266⅓ cubic feet, in the twenty-four hours. The air which has passed through the lungs contains about 1-26th part of carbonic acid; and thus about 17,856 cubic inches (or rather more than 10 cubic feet) of that gas, containing 2616 grains, or about 5½ ounces of solid carbon, are thrown off in the course of twenty-four hours. Now, carbonic acid, when diffused through the atmosphere to any considerable amount, is extremely injurious to animal life; for it prevents the due excretion by the lungs, of that which has been formed within the body; and the latter consequently accumulates in the blood, and exercises a very depressing influence on the action of the various organs of the body, but particuarly on that of the nervous system. The usual proportion is not above 1 part in 1,000; and when this is increased to 1 part in 100, its injurious effects begin to be felt by man, in head-ache, languor, and general oppression. Now it is evident, from the statements we have just made, that as a man produces in twenty-four hours about 10 cubic feet of carbonic acid, if he were enclosed in a space containing 1,000 cubic feet of air (such as would exist in a room 10 feet square and 10 feet high), he would in twenty-four hours communicate to its atmosphere from his lungs, as much as 1 part in 100 of carbonic acid, provided that no interchange takes place between the air within and the air outside the chamber. The amount would be farther increased by the carbonic acid thrown off the skin, the quantity of which has not yet been determined. In practice, such an occurrence is seldom likely to take place; since in no chamber that is ever constructed, except for the sake of experiment, are the fittings so close, as to prevent a certain interchange of the contained air, with that outside. But the same injurious effect is often produced by the collection of a large number of persons for a short time, in a room insufficiently provided with the means of ventilation. It is evident, that if 12 persons were to occupy such a chamber for two hours, they would produce the same effect with that occasioned by one person in twenty-four hours. Now we will suppose 1,200 persons to remain in a church or assembly-room for two hours; they will jointly produce 1,000 cubic feet of carbonic acid in that time. Let the dimensions of

such a building be taken at 80 feet long, 50 broad, and 25 high; then its cubical contents will be (80×50×25), 100,000 cubic feet. And thus an amount of carbonic acid, equal to 1-100th part of the whole, will be communicated to the air of such a building, in the short space of two hours, by the presence of 1,200 people, if no provision is made for ventilating it. And the quantity will be greatly increased, and the injurious effects will be proportionably greater, if there is an additional consumption of oxygen, produced by the burning of gas-lights, lamps, or candles. Hence we see the great importance of providing for free ventilation, wherever large assemblages of persons are collected together, even in buildings that seem quite adequate in point of size to receive them; and much of the weariness which is experienced after attendance on crowded assemblies of any kind, may be traced to this cause.—CARPENTER's *Animal Physiology*.

RESPIRATION OF MAN.

The atmosphere covers the surface of the earth, as an ocean, about fifty miles deep. A man's chest contains nearly two hundred cubic inches of air; but in ordinary breathing he takes in at one time, and sends out again, about 20 cubic inches—the bulk of a full-sized orange; —and he makes about fifteen inspirations in a minute. He vitiates, therefore, in a minute about the sixth part of a cubic foot; but which, mixing as it escapes with many times as much of the air around, renders unfit for respiration three or four cubic feet. The removal of this impure air, and the supply in its stead of fresh air, is accomplished thus: the air which issues from the chest, being heated to near the temperature of the living body, namely, 98°, and being thereby dilated, is lighter, bulk for bulk, than the surrounding air at any ordinary temperature; it therefore rises in the atmosphere, to be diffused there, as oil set free under water rises; in both cases a heavier fluid is, in fact, pushing up and taking the place of a lighter. In aid of this process come the greater motions in the atmosphere called winds, which mingle the whole, and favor agencies which maintain the general purity.—DR. NEIL ARNOTT.

EXHALATIONS FROM THE SKIN.

The amount of fluid exhaled from the skin and lungs in twenty-four hours, probably averages about three or four pounds. The largest quantity ever noticed, except under extraordinary circumstances, was 5 lbs.; and the smallest 1¾ lbs. It contains a small quantity of solid animal matter, besides that of other secretions of the skin, which are

mingled with it; and there is good reason to think that this excretion is of much importance, in carrying off certain substances which would be injurious if allowed to remain in the blood.—CARPENTER'S *Animal Physiology.*

TEMPERATURE OF MAN.

To the uneducated it appears no less erroneous to say, that the body is equally warm on a cold winter morning, as on the most sultry of the dog-days, than to affirm that the sun is stationary, contrary to the apparent evidence of the senses; yet the one is as well ascertained as the other. For example, at Ceylon, Dr. Davy found that the temperature of the native inhabitants differed only about one or two degrees from the ordinary standard in England.

Aged persons are generally thought to be more susceptible of cold than the young. The heat of human beings has, however, been proved to be very nearly the same, whatever may be their age, their type, or the race to which they belong; and whatever may be the nature of their food, as the comparative researches of Dr. Davy prove, from the priests of Buddha, the Hindoos, eaters of rice, and the Vedas who live entirely on animal food.

WE DIE DAILY.

The bodies of animals are continually undergoing a series of invisible changes of substance, of which they are entirely unconscious. We look at our hand to-day, as we write, and we fancy it is the same substance as it was yesterday, or last year—as it was ten years ago. The form of each finger, of each nail, is the same. Scars made in our infancy are still there. Nothing is altered or obliterated; and yet it is not the same hand. It has been renewed over and over again since the days of our youth. The skin, and flesh, and bone, have been frequently removed and replaced. And so it is, more or less, with our whole body. The arms and limbs that sustained us in our schoolboy struggles are long since consigned to the dust, have perhaps lived over again more than once in plant, or flower, or animal. *In from three to five years the entire body is taken out and built in again with new materials.* A continued activity prevails among the living agencies to which this hidden work is committed. Every day a small part is carried away; just as if a single brick were every day taken out of an old wall, or a single wheel out of a watch, and its place supplied by another. The body therefore requires constant supplies, at every period of its life, of all those things of which its several parts are built up.—*North British Review, No.* 6.

WE BREATHE THAT WE MAY LIVE.

During respiration we draw into our lungs atmospheric air containing a very minute proportion of carbonic acid gas—two gallons in 5,000 gallons of air. But when we return the air to the atmosphere from our lungs, it contains a much larger proportion of this gas. It is constantly produced in the blood, and given off from the surface of the lungs into the air. A full-grown man throws off as much carbonic acid every day as contains eight or ten ounces of carbon; a cow or a horse about five times as much. This carbon the animal derives in great part from the starch or sugar which it eats; and thus the purpose or function of all the parts of the blood is explained. The gluten repairs the waste of the muscles, the oil lays on fat, the saline matters yield their necessary ingredients to the bones and the blood, and the starch feeds the respiration.—*North British Review*, *No.* 6.

THE FACIAL ANGLE AS A SIGN OF INTELLECTUAL POWER.

The size of the brain, and especially of its anterior lobes (which seem particularly connected with the higher reasoning powers), as compared with that of the face, may be estimated pretty correctly by the measurement of the facial angle, as proposed by Camper, an eminent Dutch naturalist. This is done by drawing a horizontal line between the entrance to the ear, and the floor of the cavity of the nose, so as to pass in the direction of the base of the skull; this is met by another line which passes from the most prominent part of the forehead to the front of the upper jaw. It is evident that this last will be more inclined to the former, so as to make a more acute angle with it, in proportion as the face is more developed, and the forehead more retreating; whilst it will approach more nearly to a right angle if the forehead be prominent, and the muzzle project but little. Hence this facial angle will indicate, with tolerable correctness, the proportion which the brain bears to the face,—the instrument of intelligence, to the receptacle of the organs of sense. Of all animals, there are none in which the facial angle is so open as in man; and there exist, in this respect, great variations, even among the different human races. Thus, in European heads, the angle is usually about 80°. The ancient Greeks, in those statues of Deities and Heroes to which they wished to give the appearance of the greatest intellectual power, made it 90°, or even more, by the projection they gave to the forehead. On the other hand, in the negro races, it is commonly about 70°; in the different species of the monkey tribe, it varies from about 65° to 30°; and as

we descend still lower, we find it becoming still more acute. In the horse and boar, for example, it becomes impossible to draw a straight line from the forehead to the upper jaw, in consequence of the retreating character of the former, and the projection of the nose. In birds, reptiles, and fishes, the facial angle, when it can be measured, is found to be still further diminished.—CARPENTER's *Animal Physiology*.

POWER OF THE WILL OVER VOCAL ACTION AND THE MEANS BY WHICH IT ACTS.

The power which the will possesses of determining, with the most perfect precision, the exact degree of tension which these ligaments shall receive, is extremely remarkable. Their average length in the male, in a state of repose, is estimated at about 73-100ths of an inch; whilst in the state of greatest tension, it is about 93-100ths; the difference is therefore about 20-100ths, or 1-5th of an inch. In the female glottis, the average dimensions are about 51-100ths, and 63-100ths, respectively; so that the difference is only 12-100ths, or less than 1-8th of an inch. Now the natural compass of the voice (or distance between its highest and lowest notes) in most persons who have cultivated the vocal organ, may be stated at about two octaves, or 24 semitones. Within each semitone, a singer of ordinary capability could produce at least 10 distinct intervals; so that, for the total number of intervals, 240 is a very moderate estimate. There must, therefore, be at least 240 different states of tension of the vocal cords, every one of which can be at once determined by the will; and the whole variation in their length being not more than 1-5th of an inch, even in man, the variation required to pass from one interval to another will not be more than 1-1200th of an inch. And yet this estimate is much below that which might be truly made, from the performance of a practised vocalist. It is said that the celebrated Madame Mara was able to sound 100 different intervals between each tone. The compass of her voice was at least 20 tones; so that the total number of intervals was 2,000, all comprised within an extreme variation of 1-8th of an inch; hence it may be said that she was able to determine the contractions of her vocal muscles to the 1-16,000th of an inch. It is on account of the greater length of the vocal cords, that the pitch of the voice is much lower in man than in woman; but this difference does not arise until the end of the period of childhood,—the size of the larynx being about the same in the boy and girl, up to the age of 14 or 15 years, but then undergoing a rapid increase in the former, whilst it remains nearly stationary in the latter. Hence it is that boys, as well as girls and

women, sing treble; whilst men sing tenor, which is about an octave lower than the treble, or bass, which is lower still. The cause of the variations of timbre or quality in different voices, is not certainly known; but it appears to be due, in part, to difference in the degree of flexibility and smoothness in the cartilages of the larynx. In women and children these cartilages are usually soft and flexible, and their voices clear and smooth; whilst in men, and in women whose voices have a masculine roughness, the cartilages are harder, and are sometimes almost completely ossified. The loudness of the voice depends in part upon the force with which the air is expelled from the lungs; but the variations in this respect which exist among different individuals, are due to the degree in which its resonance is increased, by the vibration of the other parts of the larynx, and of the neighboring cavities.—CARPENTER'S *Animal Physiology.*

CONSTITUTIONAL PECULIARITIES OF MULATTOES.

Dr. Nott, whose long residence in the Slave States renders his testimony valuable, gives, in the "Types of Mankind," the following summary of the result of his observations. 1. That mulattoes are the shortest-lived of any class of the human race. 2. That mulattoes are intermediate in intelligence between the blacks and the whites. 3. That they are less capable of undergoing hardships than either the blacks or whites. 4. That the mulatto women are peculiarly delicate, and subject to a variety of chronic diseases. That they are bad breeders, bad nurses, liable to abortions, and that their children generally die young. 5. That when mulattoes intermarry, they are less prolific than when crossed on the parent stocks. 6. That when a negro man married a white woman, the offspring partook more largely of the negro type than when the reverse union had effect. 7. That mulattoes, like negroes, although unacclimated, enjoy extraordinary exemption from yellow fever when brought to Charleston, Savannah, Mobile, or New Orleans. These conclusions, however, are strictly correct only where the intermarriages occur between people of the Anglo-Saxon and negro races. Where they concern those derived from the southern countries of Europe, as French, Italians, Spaniards, &c., such shortness of life and improlificacy of the mulattoes does not hold good.

PECULIARITIES OF THE ORIGINAL AMERICAN RACE.

Dr. Morton, in his *Crania Americana*, gives the following as his conclusions from his examination of the American races: 1. That the

American race differs essentially from all others, not excepting the Mongolian. 2. That the American nations, excepting the Polar tribes, are of one race and of one species, but of two great families, which resemble each other in physical, but differ in intellectual character. 3. That the cranial remains discovered in the mounds from Peru to Wisconsin belong to the same race, and probably to the Toltecan family.

SIZE OF THE HUMAN BRAIN.

Dr. Samuel George Morton gives the following as among the results of the internal measurements of 623 human crania, made with a view to ascertain the relative size of the brain in various races and families of man:—The Teutonic or German race, embracing as it does the Anglo-Saxons, Anglo-Americans, Anglo-Irish, &c., possesses the largest brain of any people. The nations having the smallest heads are the ancient Peruvians and Australians. The barbarous tribes of America possess much larger brain than the semi-civilized Peruvians or Mexicans. The ancient Egyptians, whose civilization antedates that of all other people, and whose country has been justly called "the cradle of the arts and sciences," have the least-sized brain of any Caucasian nation excepting the Hindoos; for the small number of Semitic heads will hardly permit them to be admitted into the comparison. The negro brain is nine cubic inches less than the Teutonic, and three cubic inches larger than the ancient Egyptians. The largest brain in the series is that of a Dutch gentleman, and gives 114 cubic inches; the smallest head is an old Peruvian of 58 cubic inches; and the difference between these two extremes is no less than 56 cubic inches. The brain of the Australian and Hottentot falls far below the negro, and measures precisely the same as the ancient Peruvian. This extended series of measurements fully confirms the facts stated in the *Crania Americana*, that the various artificial modes of distorting the cranium occasion no diminution of its internal capacity, and consequently do not affect the size of the brain. Sir William Hamilton, in a paper communicated to Jameson's Journal, objects to Dr. Morton's conclusions; adding that he (Sir W. H.) has now established, apart from the proofs by averages, that the human encephalon does not increase after the age of seven, at highest. This has been done, by measuring the heads of the same young persons, from infancy to adolescence and maturity; for the slight increase of the head, after seven (or six) is exhausted by the development to be allowed in the bones, muscles, integuments, and hair.

YEARLY FOOD OF ONE MAN.

From the army and navy diet scales of France and England, which, of course are based upon the recognized necessities of large numbers of men in active life, it is inferred that about two and one-fourth pounds avoirdupois of dry food per day, are required for each individual; of this about three-fourths are vegetable and the rest animal. At the close of an entire year, the amount is upwards of eight hundred pounds. Enumerating under the title of water all the various drinks —coffee, tea, alcohol, wine, &c.—its estimated quantity is about fifteen hundred pounds per annum. That for the air received by breathing may be taken at eight hundred pounds. With these figures before us, we are able to see how the case stands. The food, water, and air, which a man receives, amount in the aggregate to more than three thousand pounds a year; that is, to about a ton and a half or more than twenty times his weight.

STATURE OF MAN.

An erroneous notion obtains belief, that the present Stature of the Human Race is considerably less than it has been in past ages. This error may, in part, have originated in the olden tales of men of gigantic stature, which are now almost univerally discredited. At the same time, it is extremely probable that the size of the race, notwithstanding some local variations, has not sensibly diminished; and, not only from the concurrence of many kinds of proofs from historical evidence from the earliest known periods, but from considerations of science in the absence of all monuments, it may be inferred that there has been no material change since the origin of mankind.

WHAT ARE TEARS?

The distinction of tears shed from various causes are but imperfectly understood. Let us, therefore, hear Mr. Abernethy on the subject —"What are the tears? Now, anybody making such an inquiry would really surprise a person who had not reflected on the subject. What are the tears? Does not everybody know what the tears are? One would think that a person who instituted such an inquiry had never seen a *blubbering boy* with the salt water running down his cheeks. Aye, but are these tears? Those are tears, to be sure, such as are shed from irritation or from sorrow, but they are not the *common* tears. They inflame the eye, they excoriate the very cheek down which they run. What are those salt water tears? O, they are the

product of the lachrymal gland, which is lodged in a slight fossa of the orbitary part of the *os frontis*. It is the property of these glands—the salivary glands—to secrete occasionally, and not continually, and to secrete profusely at times. This is the source of the salt water which is shed for our grief, or when any thing irritates the surface of the eye; but it is a kind of salt water not calculated for lubricating the surface of the eye; that you may be assured of. What are the common tears? Unquestionably, a very lubricous fluid to facilitate the motion of the eyelid upon the front of the eyeball—a mucilaginous liquor—a thin mucilage—secreted from the whole surface of the concavity. That it is mucilage, is manifest; for, where it is abundant in quantity, and perhaps having a greater abundance than common, in consequence of inflammation, does it not *gum* the eyelids together? I say it is a mucilaginous secretion, excellently calculated for preserving the front of the eye, and for preserving it moist, so that it may be transparent."

NATURE OF HAIR.

Hair does not, as was hitherto supposed, form an essential part of the skin. It has a principle of existence of its own; and Cuvier considers the organic system which produces hair as forming part of that of the senses: the slightest touch, even that produced by a hair of the human head, is sufficient to make certain animals, cats for example, contract their skin and make it tremble, as they always do to rid it of light bodies which stick to it; and of the presence of which they are apprised by this peculiar sense of touch.

THE TONGUE,

Is not an indispensable organ of taste, as is commonly supposed. Blumenbach saw an adult, and in other respects a well-informed man, who was born without a tongue. He could distinguish, nevertheless, very easily the tastes of solutions of salt, sugar, and aloes, rubbed on his palate, and would express the taste of each in writing.

COMPOSITION OF THE HUMAN BODY.

The living animal is made up for the most part of water. A man of 154 lbs. weight contains 116 lbs. of water, and only 38 lbs. of dry matter. From his skin and from his lungs water is continually evaporating. Were the air around him perfectly dry his skin would become parched and shrivelled, and thirst would oppress his feverish frame.

The air which he breathes from his lungs is loaded with moisture. Were that which he draws in entirely free from watery vapor, he would soon breathe out the fluids which fill up his tissues, and would dry up into a withered and ghastly mummy. It is because the simoom and other hot winds of the desert approach to this state of dryness, that they are so fatal to those who travel on the arid waste.—JOHNSTON'S *Chemistry of Common Life.*

Prof. Quetelet states that of the 38 pounds of dry matter in the model man, 24 lbs. are flesh and fat, and 14 lbs. bone; 28 lbs. are organic matter (combustible), 10 lbs. mineral matter (incombustible). If a hundred pounds of human blood be rendered perfectly dry, by a heat not much exceeding that of boiling water, it will be reduced in weight to somewhat less than twenty-two pounds. It loses about 78½ per cent. of water. The blood weighs, in the liquid state, nearly twenty pounds in a healthy full-grown average man, and it consists very nearly of 15⅔ lbs. of water and 4⅓ lbs. of solid matter. The blood contains by weight only one-eighth of the dry matter of the body, so that the strength of the latter could be sustained only for a very short period without supplies from other sources. And yet an animal does not die of starvation till it has lost two-fifths of its weight, and more than a third of its heat.

LEPROSY.

The ancient leprosy is not a distinct disease. Found in most parts of the world from the scriptural and classic eras through the middle ages down to the present time, it has only within the last two centuries been banished from England and France by improved modes of living. Persons who have been much abroad every now and then, become subject to this disease, sometimes many years after their return home. I saw an instance of this sort in London within the last fifteen months. The Crimea is one of its lurking-places, and it may even after a long lapse of time show itself in some of the survivors of the siege of Sebastopol. It is called in the Crimea by the Cossacks *Tschornaia Nemoschtsch*, the black disease, because the first symptoms of the eruption consist in a darkened color of the face. The disease of the Crimea is described in *Gruelius' Journey through Russia*, vol. 2, p. 169, and in *Pallas' Journey*, vol. 1, p. 302. Its especial causes are hardship, privation, exposure to cold and wet, bad or insufficient food, and the absence of the means of cleanliness concurring. These induce a peculiar morbid condition of the blood, whence the disease springs.—W. E. C. NOURSE, *in Notes and Queries.*

ARSENIC EATERS OF AUSTRIA.

Nearly all the inhabitants, particularly in the mountains adjoining Hungary, are in the habit of eating arsenic. They purchase it under the name of *hedri* from travelling peddlers, who procure it from workmen at the glass-factories, from veterinary surgeons, &c. The effect of the poison, when taken in moderate quantities, is to give a freshness to the complexion and afterwards to impart a certain degree of *embonpoint*. But the number of deaths, in consequence of taking too much of the article, is by no means inconsiderable. Every ecclesiastic can cite examples of these deaths, though it is not easy to give a knowledge of them, as either through fear of the law which forbids any one to keep arsenic in his possession, or through a consciousness of doing wrong, the arsenic-eaters conceal as much as possible their habit of using it; it is only on the bed of death that they confess what they have done. Another advantage which the arsenic-eaters derive from the use of the poison is to have their respiration facilitated in ascending the mountains. Whenever they are about to set out on a long excursion, they place a little piece of arsenic in their mouth, and the effect produced is really marvellous, as they ascend the greatest heights with ease. I may add, that, bearing this fact in mind, I have administered arsenic in cases of asthma with success. The quantity with which the arsenic-eaters commence is a piece about the size of a pea. They take it in the morning fasting, and augment the dose insensibly. A peasant, whom I was well acquainted with, takes at present about four times that quantity, and enjoys good health. He has been indulging in the habit for forty years; his father did the same before him, and his sons will probably follow the example thus offered to them. The habit of the grooms and coachmen at Vienna of giving arsenic to their horses is well known. They sometimes throw a pinch of it amongst the oats, and sometimes tie up a small bit in a linen rag, which they attach to the bit when the horse is harnessed. The saliva dissolves the poison, and the horse evidently delights in it. The effect on horses of taking it is to put them in high condition, with the skin smooth and shining, and to increase their spirit. The carters in the mountainous countries of Austria are also in the habit of giving arsenic to their horses when about to ascend a steep road, and the effect is really marvellous, as the animals go along with extraordinary ease. It is, however, worthy of remark, that though arsenic may be given to a horse for years without any injury arising, if the habit is interrupted, the animal at once falls off, loses its appetite, and no matter what quantity of food may be

given it, never regains its strength, healthy appearance and courage.—Dr. Tschudi.

Johnston, in his "Chemistry of Common Life," after mentioning these facts, says that among other ways in which arsenic acts chemically upon the system, experiment will probably show that it lessens the natural waste of the body, and especially that it diminishes the quantity of carbonic acid discharged from the lungs in a given time. The consequence of this action upon the lungs will be *first*, that less oxygen will require to be inhaled, and hence a greater ease in breathing under all circumstances, but which will be especially perceived in climbing hills; *second*, that the fat of the food which would otherwise be used up in supplying carbonic acid to be given off by the lungs, will be deposited instead in the cellular tissue beneath the skin, and thus will feed, plump out and render fat and fleshy the animal which eats it.

SKIN-DEEP WOUNDS.

The extreme sensibility of the skin to the slighest injury has originated the notion that the pain must be the more severe the deeper the wound. This is not the fact; nor would it accord with the beneficent design which shines out everywhere. The sensibility of the skin serves not only to give the sense of touch, but it is a guard upon the deeper parts; and as they cannot be reached except through the skin, and we must suffer pain therefore before they are injured, it would be superfluous to bestow sensibility upon these deeper parts. If the internal parts which act in the motions of the body had possessed a similar degreee and kind of sensibility with the skin, so far from serving any useful purpose, this sensibility would have been a source of inconvenience and continual pain in the common exercise of the frame. The fact of the exquisite sensibility of the surface, in comparison with the deeper parts, being thus ascertained by daily experience, we cannot mistake the intention, that the skin is made a safeguard to the delicate textures which are contained therein, by forcing us to avoid injuries: and it does afford us a more effectual defence than if our bodies were covered with the hide of the rhinoceros.

RECOVERY FROM DROWNING.

Little or no water is found in the stomach of a drowned person; and when it is present, it can in no way have contributed to death. The experiments of Orifila and Marc have proved that water is never found in bodies submersed after death; and that it cannot be made to

enter the stomach without the assistance of a tube passed into the gullet. This fact and that of little or no water entering the lungs, cannot be too widely propagated, as the popular prejudice is in favor of the opposite opinion; and bodies taken out of the water are still rolled on barrels, and held up by the heels, in order to dislodge it; a practice fraught with the greatest danger, if the smallest chance of resuscitation exist.

CAUSES OF DROWNING.

Dr. Arnott, in his *Elements of Physics*, states the following reasons why, in ordinary accidents, so many persons are drowned who might easily be saved:—

1. Their believing that the body is heavier than water, and therefore that continued exertion is necessary to keep them swimming; and hence their generally assuming the position of a swimmer, in which the face is downwards, and the whole head has to be kept out of water to allow of breathing. Now, as a man cannot retain this position without continued exertion, he is soon exhausted, even if a swimmer; and if not, the unskilful attempt will scarcely secure for him even a few respirations. The body raised for a moment by exertion above the natural level, sinks as far below it when the exertion ceases; and the plunge, by appearing the commencement of a permanent sinking, terrifies the unpractised individual, and renders him an easier victim to his fate.

2. From a fear that water by entering the ears may drown, as if it entered by the nose or mouth, a wasteful exertion of strength is made to prevent it; the truth being, however, that it can only fill the outer ear, or as far as the membrane of the drum, and is therefore of no consequence. Every diver and swimmer has his ears filled with water, and with impunity.

3. Persons unaccustomed to the water and in danger of being drowned, generally attempt in their struggle to keep their hands above the surface, from feeling as if their hands were tied while held below; but this act is most hurtful, because any part of the body kept out of the water in addition to the face, which must be out, requires an effort to support it, which the individual is supposed at the time incompetent to afford.

4. The not having reflected that when a log of wood or a human body is floating upright, with a small portion above the surface, in rough weather, as at sea, every wave in passing must cover the head for a little time, but will again leave it projecting in the interval. The practised swimmer chooses this interval for breathing.

5. Not knowing the importance of keeping the chest as full of air as possible, the doing which has nearly the same effect as tying a bladder of air to the neck, and without other effort will cause nearly the whole head to remain above the water. If the chest be once emptied, while from the face being under water, the person cannot inhale again, the body remains specifically heavier than water, and will sink.

DIVISION OF THE ANIMAL KINGDOM.

The division of nature into the three kingdoms, animal, vegetable, and mineral, is one of the things which we owe to the much-derided alchemists.—Geoffroy St. Hilaire, *Histoire des Règnes Organiques.*

STRUCTURE AND POISON OF THE RATTLESNAKE.

Among a number of living reptiles placed at my disposal, for anatomical and physiological uses, were two quite large and beautiful Rattlesnakes (*Crotalis durissimus*), with which I lost no time in making many experiments. The largest, a little more than four feet in length, and having fourteen rattles, was killed, and I made a dissection of its mouth, in order to learn some details of the anatomical relations of the fangs and poison apparatus. The two fangs in use with the poison-sacs at their base, presented nothing remarkable, excepting that they were old and worn, and evidently soon to be shed. But directly behind these, the mucous membrane on each side was crowded with what might be called the fangs of reserve; for like successive teeth elsewhere, they were ready for complete development in turn, as fast as those in use passed away. These were of all sizes, from near that of the fangs in use, down to the smallest germ, and I was able to easily count twelve on each side. Their developments, studied with the microscope, appeared as follows: First, a minute involution of the mucous membrane (the tooth follicle). In this is seen a small conical papilla as the first trace of the future fang. This is gradually developed by the aggregation of cells, and when about 1-25th of an inch in length, its cavity (the pulp-cavity) is occupied with a network of blood-vessels. The growth after this is more rapid and determinate. The epithelial cells covering the apex of the papilla become lineally arranged, and fusing together, form fibres, which, when filled with calcareous salts, constitute the intimate structure of the enamel. This enamel is formed very early, and some time before the appearance of the dentine or ivory: so that at one period you find

simply the epithelial tooth-sac crowned with a point of enamel. As the tooth-sac increases and is pushed out, the enamel point is more and more elongated, becoming finally very long and acicular, and with the sharpness well known in the perfect fang. Meanwhile the dentine, or ivory, is formed, and as this process is going on, its edges begin to roll towards each other on the convex and upper surface of the tooth. This rolling of the edges to meet each other, continues gradually with the growth of the tooth; being first a half, and usually at last a complete canal. This canal is the poison duct; and being thus formed, two results ensue: 1st. It is outside, and disconnected with the pulp-cavity, but communicates with the tooth-follicle at its base. 2d. It is only in the ivory substance, terminating externally at the point where this last connects with the enamel; the enamel-point, therefore, being free and solid. Thus formed, these fangs seem to be in waiting to replace the old ones in the event of their being removed, or naturally shed. How this replacement takes place I am unable to say from observation. But it appears to me that the original tooth-follicle becomes the poison-gland or sac; for several of the larger reserve-fangs had each a small sac, embracing its base, and which appeared to be only the primitive tooth-sac; and moreover, the largest pair of these reserve fangs lay directly behind the ones in use. The replacement might, therefore, occur as with the higher animals,—the pair of reserve passing gradually together with the poison gland, into the places of those removed. But however occurring, the substitution is exact and complete, and may take place in a very short time, for Dr. Dearing informed me, that from one of his captive specimens, he extracted the fangs which were exactly replaced in six weeks; there are many facts tending to show that these fangs are naturally shed once in a while if not regularly; at all events, their points are likely to be broken off by frequent use, and however removed, Nature appears to have provided an ample stock in reserve for their almost indefinite repletion. The virulence of the poison of these animals is too well known for special description. I will only add, there is good reason for the belief that its action is the same upon all living things, vegetables as well as animals. It is even just as fatal to the snake itself, as to other animals; for Dr. Dearing informed me that one of his specimens, after being irritated and annoyed in its cage, in moving suddenly, accidentally struck one of its fangs into its own body; it soon rolled over and died as any other animal would have done. Here, then, we have the remarkable, and, perhaps, unique physiological fact, of a liquid secreted directly from the blood, which proves deadly when introduced into the very

source (the blood) from which it was derived! With the view of ascertaining the power and amount of this poison, Dr. Dearing performed the following experiment: The snake was a very large and vicious one, and very active at the time. He took eight half-grown chickens, and allowed the snake to strike at each under the wing, as fast as they could be presented to him. The first died immediately; the second after a few minutes; the third after ten minutes; the fourth after more than an hour; the fifth after twelve hours; the sixth was sick and drooping for several days, but recovered; the seventh was only slightly affected, and the eighth not at all. With my second remaining specimen I was desirous of performing several experiments, as to the action of this poison on the blood. The following is one: The snake was quite active, and as any one approached the cage, began to rattle violently; but twenty-five or thirty drops chloroform being allowed to fall on his head, one slowly after the other, the sound of his rattle gradually died away, and in a few minutes he was wholly under the effects of this agent. He was then adroitly seized behind the jaws with the thumb and fore-finger, and dragged from the cage and allowed to partially resuscitate; in this state, a second person held his tail to prevent his coiling around the arm of the first, while a third opened his mouth, and with a pair of forceps pressed the fang upward, causing a flow of the poison, which was received on the end of a scalpel. The snake was then returned into the cage. Blood was then extracted from a finger, for microscopical examination. The smallest quantity of the poison being presented to the blood between the glasses, a change was immediately perceived—the corpuscles ceased to run and pile together, and remained stagnant without any special alteration of structure; the whole appearance was as though the vitality of the blood had been suddenly destroyed, exactly as in death from lightning. This agrees, also, with another experiment performed on a fowl where the whole mass of the blood appeared quite liquid, and having little coagulable power. The physiological action of this poison in animals, is probably that of a most powerful sedative acting through the blood on the nervous centres. This is shown by the remarkable fact, that its full and complete antidotes are the most active stimulants; of these, alcohol, in some shape, is the first.—Dr. W. J. Burnett, *before the Boston Natural History Society.*

THE STING OF THE MOSQUITO.

One of the most remarkable features in the anatomy of the mosquito is, that the parts which constitute the mouth are elongated, so

as to form a beak extending horizontally like that of some birds. The beak or sting is about half the length of the body, and to the unassisted eye appears to be very simple in its structure. When examined with the microscope, however, it is found to be composed of seven different parts, which are comparatively stout on one edge. These parts vary in length, and can be separated from each other without much difficulty. They are broad at the upper part, where they are united to the head, and they gradually taper to a point. One of the parts is a tubular canal or groove, in which the others are lodged when the proboscis is not in use. I have not been able to find any appearance of teeth, except on the two longest pieces: in these I have found them near the tip. The two longest pieces, also, are marked by transverse lines, extending from one edge to the other, throughout their whole length.—Dr. Durkee, *before the Boston Society of Natural History*.

THE CHAMELEON.

The cause of the different changes of color which the Chameleon undergoes is not even yet well understood. It is said that the *rete muscosum*, or colored layer of the skin, contains two kinds of pigment, situated in different layers; the deeper-seated layer is of a deep green or violet-red color; the superficial pigment is of a grayish color; the deep-seated pigment is contained in branched cavities, and is movable, producing by its partial accumulation and varying proportions with the superficial layer the changes of color for which the Chameleon has in all ages been remarkable. Dr. Shaw says, that the general or usual changes of color in the Chameleon, are from a bluish ash-color (its natural tinge) to a green and sometimes yellowish color, spotted unequally with red. If the animal be exposed to a full sunshine, the unilluminated side generally appears, within the space of some minutes, of a pale yellow, with large roundish patches or spots of red-brown. On reversing the situation of the animal the same changes take place in an opposite direction; the side which was before in the shade now becoming brown or ash-color, while the other side becomes yellow and red; but these changes are subject to much variety, both as to intensity of colors and disposition of spots.—Maunder's *Treasury of Natural History*.

ARAB HORSES.

Though the Arabs justly boast of their Horses, it is a common error that supposes them to be very abundant in Arabia. In the

Sacred Writings, and down to the times of Mohammed, they are seldom mentioned; camels being mostly used both in their warlike and predatory excursions. The breed is limited to the fertile pasture-grounds, and it is there only that they thrive; while the Bedouins, who occupy arid districts, rarely have any. In Nejed, they are not nearly so numerous as in the rich plains of Syria and Mesopotamia. In Hejar, they become scarcer; and thence towards Yemen, they become fewer still, both the climate and pasture there being reckoned injurious to their health. The great heat of Oman is also deemed unfavorable to them. In the district of Gebel Shammar, there are many encampments that possess none; in Medina they are not seen, and in Mecca there are, perhaps, not more than sixty belonging to private individuals; so that the estimate of Burckhardt is, perhaps, correct, when he affirms, that from Akaba to the shores of Hadramant, comprising the great chain of mountains and the western plains towards the sea, the amount of horses is not more than 5,000 or 6,000; while the aggregate number in the whole peninsula does not exceed 50,000—a number far inferior to what the same superficial extent in any other part of Asia or Europe would furnish. Neither are all the Arab horses of the most select race—of the most perfect or distinguished quality; and perhaps, not above five or six in a whole tribe deserve the name of first-rate in respect to size, bone, beauty, and action. Still, their numbers are considerable; each of which may be bought, if purchased in the desert, at from £150 to £200.

It may be remarked that the Arabs have great faith in certain superstitious charms, which they suppose will protect their horses from accidents. They use talismans written on a piece of triangular paper, which are put into a leathern purse of the same shape, and fastened round the animal's neck, as a defence against witchcraft from unlucky eyes. A couple of boar's tusks, joined at the extremities by a silver ring, are suspended from their mane to keep them from the farcy.

MEMORANDA ABOUT DOGS.

It is remarkable, that from this faithful animal, the companion of man, and the guardian of his person and property, should originate so many terms of vile reproach and low comparison,—as, you dog, you cur, you hound, you whelp, you puppy; so dog's trick, dog cheap, dog trot, dog sick, dog weary, doggerel rhymes, to lead the life of a dog, or to use like a dog. This may be traceable to the East, where the dog is held in abhorrence as the common scavenger of the streets.

"Him that dieth in the city the dogs shall eat," was said of Jeroboam with his family (1 Kings xiv. 11); of Baasha (1 Kings xvi. 4), a people about to be punished for their offences by famine and pestilence. A ravenous desire for food is called a canine appetite; and of a foul and gluttonous feeder it is said, that hungry dogs will eat dirty pudding. By the Israelites the dog was accounted so abominable, that in the Levitical law the price of a dog was forbidden to be offered in sacrifice. He has also been ever the miserable victim of most cruel experiments by the anatomist and the philosopher; and when a tax was laid on his head, a general massacre of the species took place. By the Egyptians, however, the dog was an object of adoration, as the representative of one of the celestial signs; and by the Indians, as one of the sacred forms of their deities.

> "The Egyptians worshipped dogs, and for
> Their faith made internecine war."—*Hudibras.*

The Canicular or Dog-days are so called, not because dogs are at that season apt to run mad, but from the heliacal rising of Sirius, or the Dog-star, as typical of the season of greatest heat, or wane of the summer.

In moonlight nights dogs, as the emblems of vigilance, are said to be more than usually watchful, and to "bay the moon;" and they are supposed to have a sense of the odor of mortal dissolution, and to howl before the death of one of the family. They perspire by the tongue; and in hot countries, as in Africa, die if they be suddenly plunged into cold water. The young, or whelps of the dog, as is the case with all quadrupeds which bring forth litters, and have the feet divided into many segments or toes, are born blind, and so continue for ten or twelve days; and at this time they are probably deaf, as the valves of the ears are closed till the eyes are opened.

The dog was formerly taught to turn the spit and roast the meat, by continual exercise in a kind of tread-wheel; hence this kind of dog was called "*the turnspit:*"

> "But as a dog that turns the spit
> Bestirs himself and plies his feet
> To climb the wheel, but all in vain,—
> His own weight brings him back again,
> And still he's in the self-same place
> Where, at his setting out, he was."—*Hudibras.*

Well-authenticated anecdotes are related of one of a couple of turnspit dogs refusing to work the spit because it was not his turn.

The hair of a dog, when burnt, was formerly prescribed as an antidote against the effects of intoxication; hence a man too much excited by drink at night is recommended to take a hair of the same dog the next morning, as a means of gradually counteracting his state of debility; but the dram is now substituted for the hair.

It is an error to imagine that a mad dog avoids the water; for he will both drink it and swim in it as usual, and without presenting any of that horror of it which characterizes Hydrophobia in man.

The greyhound is so called, not from any allusion to color, but because he came originally from Greece, *Canis Graius;* therefore the name should be written graihound.

Mr. Jesse notes, in his *Gleanings:* "Every one has observed that dogs, before they lie down, turn themselves round and round several times. Those who have had an opportunity of witnessing the actions of animals in a wild state, know that they seek long grass for their beds, which they beat down and render more commodious by turning round in it several times. It would appear, therefore, that the habit of our domestic dogs in this respect is derived from the nature of the same species in the wild state. This is a curious fact, and serves to prove how much the instinctive habits of wild animals are retained by their domesticated progeny."

BARKING OF DOGS.

The Australian dog never barks; indeed, Gardiner, in his *Music of Nature*, states, that "dogs in a state of nature never bark; they simply whine, howl, and growl; this explosive noise is only found among those which are domesticated." Sonnini speaks of the shepherds' dogs in the wilds of Egypt as not having this faculty; and Columbus found the dogs which he had previously carried to America to have lost their propensity to barking. The barking of a dog is an acquired faculty,—an effort to speak, which he derives from his association with man.—E. T. BENNETT.

MEMORANDA ABOUT CATS.

The Cat was originally brought from Persia, and was unknown to Pliny and the Roman writers; and the term puss is thought to be a corruption of *pers.* She is the emblem of the moon, from the great changeableness of the pupil of the eye, which in the daytime is a mere narrow line, dilatable in the dark to a luminous globe; and she can, for this reason, like most animals of prey, see best by night.

It was formerly the trick of the English countryman to substitute a cat for a sucking-pig, and bring it to market in a bag; so that he who, without careful examination, made a hasty bargain, was said to buy a pig in a poke, and might get a cat in a bag; and a discovery of this cheat gave rise to the expression of *letting the cat out of the bag*, as a premature and unlucky disclosure.

The fur of the cat was of old used in trimming cloaks and coats; and in allusion to the unfitness of her flesh for food, it is said of any thing confined to one purpose only, What can you have of a cat but her skin? The catgut used for rackets, and for the finer strings of violins, is made from the dry intestines of the cat; the larger strings being from the intestines of sheep and lambs. A smaller kind of fiddle is called a kit. The scratch of the cat is supposed to be venomous, because a lacerated wound is more apt to fester than a definite cut with a sharp instrument. The tenacity of her hold has given origin to many metaphorical expressions and appellations, as the cat, or tackle, on board ship; and a cat-o'-nine-tails, or scourge, so called from the scratches it leaves on the skin, like the clawings of a cat. There is a belief that, however a cat may be thrown, she always falls on her legs. This cats usually do, because of the facility with which they balance themselves when springing from a height; which power of balancing is in some degree produced by the flexibility of the heel, the bones of which have no fewer than four joints. Again, cats usually alight softly on their feet, because in the middle of the foot is a large ball, or pad, in five parts, formed of an elastic substance; and at the base of each toe is a similar pad. It is impossible to imagine any mechanism more calculated to break the force of a fall.

From her great powers of resistance, the cat is said to have *nine lives*. "'Tis a pity you had not ten lives,—a cat's and your own," says Ben Jonson, in *Every Man in His Humour*.

The well-known tale of the monkey seizing hold of the paw of the cat, to get the roasted chestnuts from the hot embers, gave rise to the proverb, "to make a cat's-paw of one," or to make another subservient to one's own services.

This phrase is of greater antiquity than many suppose; for we find a story of a cat and a monkey, in *A Voyage round the World*, by Dr. John Francis Gemelli Careri, in 1695. The Doctor was told by D. Antony Machado de Brito, admiral of the Portuguese fleet in India, that in order to punish a mischievous monkey he placed upon the fire a cocoa nut (of which monkeys are very fond), and then hid himself to see how the monkey would take it from the fire without burning his

paws. The cunning creature looked about, and seeing a cat by the fireside, held her head in his mouth, and with her paws took off the nut, which he then threw into water to cool, and ate it.

She is thought to be particularly fond of fish:

> "What female heart can gold despise?
> What cat's averse to fish?"
>
> GRAY, *Ode on the Death of a favourite Cat.*

But this is not probable; for if a plate of fish and a plate of meat, either raw or dressed, be placed before a cat, she will generally prefer the meat.

The cat, especially the black kind, is highly charged with electricity, which is visible in the dark, when the cat is irritated, and may be produced as follows:

Place your left hand upon the throat of the cat, and with the middle finger and the thumb press slightly the bones of the animal's shoulders; then, if the right hand be gently passed along the back, perceptible shocks of electricity will be felt in the left hand. Shocks may also be obtained by touching the tips of the ears after rubbing the back. The same may also be obtained from the foot. Placing the cat on your knees, apply your right hand to the back; the left fore paw resting on the palm of your left hand, apply the thumb to the upper side of the paw, so as to extend the claws, and by this means bring your forefinger into contact with one of the bones of the leg, where it joins the paw; when, from the knob, or end of this bone, the finger slightly pressing on it, you may feel distinctly successive shocks, similar to those obtained from the ears.

The attitudes and motions of the cat are of great elegance, in consequence of her being furnished with collar-bones: she can therefore convey food to her mouth by the paw, like the monkey; can climb and clasp, strike sideways, toss her prey upwards, and seat herself on an eminence of very confined and narrow surface.

MERINO SHEEP,

It is supposed, are named from the adjective term *merino*, applied by the Spaniards to sheep moving from pasture to pasture; they are the *fine-woolled kind*, are always in the open air, and travel every season from the cool mountains of the northern portions of the kingdom to feed in winter over the southern and warmer plains of Andalusia, Mancha, and Estremadura. There are supposed to be in Spain about ten millions of this fine-woolled travelling race, tended by about fifty thousand shepherds, and guarded by thirty thousand dogs.

ARCHITECTURE OF THE BEAVER.

The stories of the Beaver using its long, broad, and flat tail as a trowel are impositions on the credulous. The tail is altogether unfitted for such operations: for mixing up the mud with other materials the animal employs its fore-paws and the mouth; while it employs the tail in the water as a paddle and rudder, to urge itself onward, and to direct its course. With its powerful incisor teeth it strips off and divides the bark of trees, which forms its principal nutriment; and it gnaws the rough thick trunks to obtain the timber for building its habitation. Its teeth are reproduced from the base as fast as they are worn down at the extremity. By good authority it is stated, that a beaver will lop off with its teeth, at a single effort, a stem of the thickness of a common walking-stick, as cleanly as if done by a gardener's pruning-knife.

CAN TOADS LIVE ENCLOSED IN STONE OR WOOD?

The Revs. Dr. Buckland and E. Stanley, from a variety of experiments to determine the possibility of these reptiles existing within blocks of stone or wood, conclude that the commonly received belief is perfectly false, notwithstanding the almost numberless instances on record, apparently well attested, of the vitality of the reptiles under the joint additional singularity of exclusion of air and privation of food.

EATABLE FROGS.

Frogs live on land the greater part of the year, and do not retire to the water till the cold nights of October, when they retreat for the winter to the bottom of stagnant pools. They arrive at full age in about five years, and are supposed to live about twelve or fifteen. They are so tenacious of life, that they will continue to live, and even jump about, several hours after their heads have been cut off. The *hind legs* of frogs are fricasseed, and their fore legs and liver are put into soup, on the Continent. The edible frog is considerably larger than the common frog, and though rare in England, is common in Italy, France, and Germany; they are brought from the country to Vienna, 3,000 or 4,000 at a time, and are sold to the great dealers, who have conservatories for them. They are caught at night by means of lights and nets, or hooks baited with worms; in Switzerland, by long rakes, with dove-set teeth, which are thrown into the water, and drawn suddenly out again. Some persons have kept frogs

as pets: Dr. Townson kept one he called "Musidora," to guard his dessert from flies.—*Proceedings of the Ashmolean Society.*

WHALEBONE.

This substance is improperly named, since it has none of the properties of bone: its correct name is baleen. It is found attached to the upper jaw, and serves to strain the water which the whale takes into its large mouth, and to retain the small animals on which it subsists. For this purpose, the baleen is in plenty, sometimes eight hundred pieces in one whale, placed across each other at regular distances, with the fringed edge towards the mouth.

Seeing that the head furnishes the baleen, the record of the ancient perquisite of the Queen's Consort of England, evinces gross ignorance of the natural economy of the whale. This privilege was, that on the taking of a whale on the British coasts, it should be divided between the King and Queen; the head only being the King's property, and the tail the Queen's. The reason for this whimsical distinction, as assigned by ancient records, was to furnish the Queen's wardrobe with whalebone!

CORAL FISHERY IN THE MEDITERRANEAN.

The coral of which ladies' ornaments are made is found in different parts of the Mediterranean, but principally on the coasts of Barbary and the Island of Sardinia. The coral is procured by means of nets made with very wide meshes and very loose in texture, which are about eighteen yards long and one wide, the wide part being let down perpendicularly in the sea, in order that the coral rock may be better embraced by the length. The fishing machine which is employed consists, however, of five nets, arranged as follows:—Two sticks, of the thickness of a man's arm, and each about two feet and a half in length, are fastened together in the form of a cross; to each of the extremities is attached a net, the length lying of course much in folds. Under the centre is attached a stone of perhaps seventy pounds weight, and to the same point is also attached another net. The rope from the centre communicates with the boat, and is stretched across a man's thigh, which is covered with a thick piece of leather. Thus arranged, the machine is thrown overboard, and the boat is propelled by sails or oars till the nets have laid hold of a rock. Then by the aid of all the crew, pieces of the rock are broken off by main force and brought up in the nets. The pieces derive their value from their weight and color. Jet-black

and rose-colored corals are the most esteemed, although a deeper red, white and a dark dirty gray abound. The last is nearly valueless. The rose-colored will sell at from sixteen to eighty dollars the rotolo of thirty-three ounces according to the weight of the piece. The coral is found at a depth varying from about eight to thirty-four fathoms, the best being near the surface. The growth of the coral is very remarkable—what is taken in one summer being often replaced the next winter.—*Household Words.*

GROWTH OF FISH.

The growth of the salmon, as proved by the marked fish of the Duke of Sutherland, in the Scotch fisheries, is notorious. In four months' time, it has been proved that the young fry, between the period of their leaving their native rivers for the sea and their return, have increased in weight varying from 8 to 7 lbs. Without the positive proof of identity by marking, this would have seemed chimerical. We have now to notice the increase, in the waters at Boitsfort, near Brussels, of the jack, the only species of fresh-water fish which has as yet been put to the test in regard to its growth. In these waters, in October, 1852, about 2000 were left as stock, none exceeding 2 lbs. in weight, the fish thus put in being indigenous to the water; these fish have been caught the present month with rod and line as high as 6 lbs. each, showing a gain in weight of 4 lbs. in 16 months—a rate only known in the first rivers in England. But the most extraordinary increase has been in the fish not indigenous. In the month of March of last year a fresh supply of jack was put in as stock from a neighboring water, the largest being 3 lbs. in weight; these fish were marked by cutting off a portion of their tail fin. Two of the fish thus marked were caught last week, one weighing 8½ lbs., another 7½ lbs., thus showing a positive increase as to one of 5¼ lbs., in a period of 11 months, taking it even upon the assumption that the fish so caught were those weighing 3 lbs. when put in, and of which weight there were but few. We have been informed that in these waters the other description of fish, such as carp, tench, perch, and eels, increases as to the two former, after the rate of 2 lbs. per annum.

PRESSURE BORNE BY ANIMAL LIFE AT GREAT DEPTHS.

The real amount of pressure borne by animal life in profound depths, is truly an interesting question for consideration and experiment. At 16 fathoms a living creature would have to sustain about

60 pounds to the square inch; and at 60 fathoms as much as 180 pounds; at 100 fathoms' depth, the pressure would amount to 285 pounds, and at 700 fathoms the creature must bear with impunity a quantity equal to 1880 pounds upon the square inch, while the pressure of 1000 fathoms of superincumbent water on the same area considerably exceeds a ton.—ADMIRAL SMYTH, *on the Mediterranean.*

Rev. W. Scoresby, in a lecture at the London Institution, stated that whales are known to descend perpendicularly from 4200 to 4800 feet; and at the latter depth he had calculated from accurate data that a large whale would have to sustain the pressure of 211,201 tons distributed over its entire surface, or about 187½ tons on every square foot of its body.

FEW FISH FOUND AT SEA.

Paradoxical as the fact may appear, there is no class of persons who eat so few fish as sailors; and the reason is, they seldom obtain them. With the exception of flying-fish, and dolphins, and perhaps a very few others, fish are not found on the high seas at a great distance from land. They abound most along coasts, in straits and bays, and are seldom caught in water more than forty or fifty fathoms in depth.

GENERATION OF THE EEL.

This *quæstio vexata*, which occupied the attention of naturalists from Aristotle downwards, was at last set at rest by Mr. Yarrell proving by minute and microscopic dissections, carried on through eighteen months in succession, that the eel is oviparous, having milt and roe like other fishes. Mr. Yarrell traced eels down to the brackish water, whither they go generally, though not universally, to deposit their spawn; and he followed the young in their extraordinary spring journeys up the great rivers, and into the brooks and rivulets, in which they seek out for themselves haunts. In numbers they are immeasurable; the shoals advance up the stream, forming a black line along the shore; nor are these journeys confined to the water—they cross fields, and climb posts and pales, in order to reach the place of their destination.

HOW ARTIFICIAL PEARLS ARE FORMED.

Sir Joseph Banks was the first naturalist who described the manner in which pearls are formed by certain testaceous animals in their shells; but his narrative was generally questioned. It was, however, fully

corroborated in 1853, when the *Hermes* steamer, being at Ningpo, the great Chinese market for these pearls, the sailors obtained some live mussels, in which, on being opened, several pearls were found in the course of formation. It appears that the Chinese introduce pieces of wood or baked earth into the live mussel, which, being irritated, covers the substance with a pearly deposit. Little metal figures, generally of Buddha, are frequently introduced, and when thus coated with pearl are valued as charms.

Artificial pearls have been made from the scales of the bleak, and other fish, since the reign of Henry IV. of France; the beads are of glass, and are coated inside with the pearl essence; and the taking of the fish and the manufacture of the pearl and beads is said to employ 100,000 persons in France and Switzerland.

Pearls, from their consisting of carbonate of lime, are, of course, very soluble in acids. Hence may have originated the account of Cleopatra dissolving a pearl in vinegar, and drinking it to Mark Antony's health at supper; which is now regarded as an historical fiction, to show the inventive talents of the voluptuous queen in her allurements for Antony, in whom she found a companion to her taste. It is, however, pretty certain that Cleopatra possessed a pearl, or pearls of great value.

THE CELL OF THE BEE.

When we behold the bee constructing its cell to contain its winter stock, and constructing it of that form which is demonstrably the strongest and the most convenient, it must be evident to every one who has given the least attention to the obvious properties of different figures, that there are only three which will admit the junction of their sides without any vacant spaces between them, all the figures being equal and similar; namely, the square, the equilateral triangle, and the hexaedron. Of these the last is the strongest and most convenient. In this form, then, we find that the cells are constructed. This is a wonderful fact: and what is equaly remarkable, the middle of every cell, on one side, is directly opposite to the point where the three partitions meet on the opposite side. By this position the cell receives additional strength. This is not all. If human ingenuity were to contrive a cell which would require the least expenditure of material and labor, it would be a question, not easily solved, at what precise angle the three planes which compose the bottom ought to meet. Maclaurin, the celebrated mathematician, by a fluxionary calculus, determined precisely the angle required; and he found, by the most

exact mensuration that the subject would admit, that it is the very angle in which the three planes in the bottom of the cell of a honey-comb do exactly meet. Again, Reaumur, presuming that the angles were adopted for the purpose of saving material, proposed to König, the mathematician, that he should determine what should be the angles of a hexagonal cell, with a pyramidal base, to require the least material. By the infinitesimal calculus, he ascertained that the greatest angle should be 109° 26′, and the smaller 70° 34′, the very angle which the bee adopts. What an astonishing coincidence is this! A profound mathematician is required to solve a very difficult problem; and it is found that his conclusion, gained by the exercise of considerable ingenuity and deep thought, was practically exhibited in the operations of the bee.—CROMBIE's *Natural Theology.*

Kirby and Spence say that "Maraldi found that the great angles were generally 109° 28′, and the smaller ones 70° 32′, and Mr. König, an eminent mathematician, calculated that they ought to be 109° 26′, and 70° 34′, to obtain the greatest strength with any given amount of material." Lord Brougham states, that he has discovered that the bee is right, and that the mathematician was wrong; and that other mathematicians with whom he has communicated agree with him, and have detected the source of the error.

SPIDERS' WEBS.

Leuwenhock has computed that 100 of the single threads of a full-grown spider are not equal to the diameter of the hair of the beard; and consequently, if the threads and hair be both round, ten thousand such threads are not bigger than such a hair. He calculates farther, that when young spiders first begin to spin, 400 of them are not larger than one of a full growth; allowing which, 4,000,000 of a young spider's threads are not so big as the single hair of a man's beard.—DR. MAUNDER.

LIGHT OF THE GLOW-WORM.

The common doctrine respecting the Light of the Glow-worm is, that it is a lamp lit up by the female to direct the darkling flight of the male. This proves to be a fallacy; for the grubs,—which, being in a state of infancy, are therefore incapable of propagating,—exhibit a no less brilliant light than the perfect insect. De Geer remarked the same light in the nymph state, which he describes as "very lively and brilliant;" and in this stage of existence it is still less capable of propaga-

tion than in that of larva. "Of what use, then," he asks, "is the light displayed by the glow-worm? It must serve some purpose yet unknown. The authors who have spoken of the male glow-worms say positively that they shine in the dark as well as the females." These plain facts appear completely to extinguish the poetical theory.

The glow-worm possesses the curious property of causing its light to cease at will. Dr. Burmeister mentions the fact, that while catching some of the flying species of glow-worms in his hat, they have so suddenly and entirely ceased to shine, that he has fancied that they must have escaped. When disturbed, the insects emit a bright, but frequently interrupted light; and when laid upon their backs they shine without intermission, in consequence of the continual motions in the endeavors of the insect to regain its position.—WESTWOOD'S *Classification of Insects.*

KEEPING FLIES OUT OF HOUSES.

In 1836 Mr. Spence communicated to the Transactions of the Entomological Society the means of excluding flies from a room with unclosed windows, by covering the openings of such windows with a net made of white or light-colored thread, with meshes an inch or more in diameter. Now there was no physical obstacle whatever to the entrance of the flies, every separate mesh being, not merely large enough to admit one fly, but several, even with expanded wings, to pass through at the same moment; consequently both as to the free admission of air and of the flies, there was practically no greater impediment than if the windows were entirely open; the flies being excluded simply from some dread of venturing across this thread-work. The only condition is, that the light enter the room on one side only; for if there be a through light from an opposite window, the flies will pass through the net.

Mr. Spence first saw this mode practised near Florence by a gentleman, who had seen it adopted in the monastery either of Camaldoli or La Verna. A passage in Herodotus, book ii. chap. 95, records that the fishermen in his time were similarly protected from gnats when asleep, by covering themselves with their casting-nets, through the meshes of which the gnats would not pass. Thus Herodotus is as correct in this passage as Geoffrey St. Hilaire showed him to be in the history of a bird (*Charadrius Egyptious* of Hasselquist) taking the gnats out of the mouth of the crocodile, which was deemed a mere fable until confirmed by the evidence of St. Hilaire when in Egypt.

DEATH WATCH.

Among the popular superstitions which the almost general illumination of modern times has not been able to obliterate, the dread of the Death Watch may well be considered as one of the most predominant; yet it must be allowed to be a very singular circumstance that an animal so common should not be more universally known, and the peculiar noise which it occasionally makes be more universally understood. The insect in question is a small beetle belonging to the timber-boring genus, Anobium; and the popular superstition alluded to is, that when its beating is heard, it is a sign that some one in the house will die before the end of the year. It is chiefly in the advanced state of spring that this little creature commences its sound, which is no other than the call or signal by which the male and female are led to each other, and which may be considered as analogous to the call of birds; though not owing to the voice of the insect, but to its beating on, or striking, any hard substance with the shield or forepart of the head. The prevailing number of distinct strokes which it beats is from seven to nine or eleven; and this very circumstance may perhaps still add to the ominous character which it bears among the vulgar. These sounds or beats are given in pretty quick succession, and are repeated at uncertain intervals; and in old houses where the insects are numerous, may be heard at almost any hour of the day, especially if the weather be warm. The sound exactly resembles that which may be made by tapping moderately hard with the finger-nail on a table. The insect is of a color so exactly resembling that of decayed wood, viz., an obscure grayish brown, that it may for a considerable time elude the search of the inquirer. It is about a quarter of an inch in length, and is moderately thick in proportion, and the wing-shells are marked with numerous irregular variegations of a lighter cast than the ground color. It is singular that this insect may so far be familiarized as to be made to beat occasionally, by taking it out of its confinement, and beating on a table or board, when it will readily answer the noise, and will continue to beat as often as required.—MAUNDER'S *Treasury of Natural History.*

BARNACLES.

It was formerly a very common superstition, that Barnacles were transformed into birds. Thus, Baptista Porta in his "Natural Magic" says, "Not only in Scotland, but also in the river of Thames by London, there is a kind of shell-fish in a two-leaved shell, that hath a foot full of plaits and wrinkles. * * They commonly stick in the keel of some

old ship. Some say they come of worms, some of the boughs of trees which fall into the sea; if any of them be cast upon shore, they die; but they which are swallowed still into the sea, live and get out of their shells, and grow to be ducks or such-like birds."

We find this illustration in *Hudibras:*

> "As Barnacles turn Poland Geese
> In th' Islands of the Orcades."

This story originated in the peculiar formation of the little mollusk which inhabits the multivalve shell, the *Pentalasmis anatifera*, which by a fleshy peduncle attaches itself by one end to the bottoms of ships or floating timber, whilst from the other there protrudes a bunch of curling and fringe-like cirrhi, by the agitation of which it attracts and collects its food. These cirrhi so much resemble feathers, as to have suggested the leading idea of a bird's tail; and hence the construction of the remainder of the fable, which Gerarde gravely records in his *Herbal*, 1597, describing the bird as "bigger than a mallard, and lesser than a goose, called by the Lancashire people a tree-goose;" and Gerarde says elsewhere, that "in the north parts of Scotland, and the Islands called Orcades," there are certain trees whereon these tree-geese and barnacles abound.

A bunch of the shells attached to a ship, or to a piece of floating timber, at a distance appears like flowers in bloom; the foot of the animal has a similitude to the stalk of a plant growing from the ship's sides, the shell resembles a calyx, and the flower consists of the tentacula, or fingers, of the shell-fish. The ancient error was to mistake the foot for the neck of a goose, the shell for its head and the tentacula for feathers. As to the body, *non est inventus.* The barnacle goose is a well-known bird, and is eaten on fast-days in France, by virtue of this old belief in its marine origin.

Sir J. Emerson Tennent asks whether the ready acceptance and general credence given to so obvious a fable, may not have been derived from giving too literal a construction to the text of the passage in the first chapter of Genesis:

"And God said, Let the *waters bring forth abundantly* the moving creature that hath life, and the *fowl* that may fly in the open firmament of heaven."

The earliest account of the barnacle is that given by Giraldus Cambrensis (12th century), in his *Topographia Hiberniæ.* The belief in the barnacle origin of the bird still prevails on the west coast of Ireland, and in the Western Highlands of Scotland.

FLIGHT OF BIRDS.

Hawks, and many other birds, probably fly at the rate of 150 miles an hour; an eider-duck, at 90 miles an hour. Sir George Cayley computes the common crow to fly at nearly 25 miles an hour. Spallanzani found the rate of the swallow at about 92 miles an hour; while he conjectures the rapidity of the swift to be nearly three times greater. A falcon which belonged to Henry IV. of France, escaped from Fontainebleau, and in twenty-four hours afterwards was found at Malta, a distance of not less than 1530 miles; a velocity nearly equal to 57 miles an hour, supposing the falcon to have been unceasingly on the wing. But, as such birds never fly by night, and allowing the day to be at the longest, his flight was, perhaps, equal to 75 miles an hour. If we even restrict the migratory flight of birds to 50 miles an hour, how easily can they perform their most extensive migrations! Fair winds may perhaps aid them at the rate of 30 or 40 miles an hour; nay, with three times greater rapidity.—DR. FLEMING's *Philosophy of Zoöogy*.

NIGHT OWLS.

Mr. Adam White, in his excellent *Popular History of Birds*, relates this striking instance of adaptive creation. "It is worthy of remark, that in all owls that fly by night the exterior edges and sides of the wing-quills are slightly recurved, and end in fine hairs or points, by means of which the bird is enabled to pass through the air with the greatest silence—a provision necessary for enabling it the better to surprise its prey."

THE STORY OF THE DODO.

This extinct bird was a native of Mauritius, in the Indo-African Ocean, and was first described by Van Neck, a Dutchman, in 1598, in which year a living specimen was embarked for Holland, but died on its way. This specimen is supposed to have been preserved at Leyden; and one of the feet is believed to be that in the British Museum. Several successive voyagers mention the bird, down to Canche, in 1638, in which year a living dodo was brought to England by Sir Hamon l'Estrange, who describes the back as of "dunn or deare colour:" it was exhibited for money, in London, in a house which bore a figure of the bird represented on canvas. This specimen has been traced to Tradescant's Museum at Lambeth, whence it was conveyed, in 1682, to Oxford by Ashmole; the body and a leg were destroyed by vermin

before 1775, but the other leg and the head are preserved to this day in the Ashmolean Museum. Here also is a large drawing of a dodo, taken from nature, by John Savery; it is important, on account of the feathers, wings, and tail; below it are a frog and a few cryptogamous plants thought by some to have been the food of the bird; but others suppose it to have fed upon the cocoa-nuts, mangos, and other fruits which in tropical forests, fall from the trees at all seasons of the year. The Oxford head and foot have been dissected, proving the dodo to have been not related to the gallinaceous birds, the ostriches, or the vultures, as many had supposed; but to have been closely allied to the pigeons, and the solitaire bird seen by Leguat in the Island of Rodrigeux in 1691. Others maintain that the dodo was evidently not a frugivorous bird, as when first taken its flesh was strong and uneatable; it was therefore believed to have been a bird *sui generis*.

There exist four oil paintings of the dodo: one in the British Museum, without the artist's name; one at the Hague; another at Berlin, by Roland Savery; and one at Oxford, by John Savery, his nephew. All these are evidently from one original, thought to be the dodo brought by Van Neck to Holland. There is a fourth picture in the possession of the Duke of Northumberland, at Syon House: it appears to have been painted by Dee Heem and Jean Goimare, in 1627. Mr. Broderip has also a picture of the bird. The figure so often copied from Sloane's drawings in the British Museum, for works on natural history, is not thought to have been taken from nature.—See the beautifully-illustrated Monograph, "the Dodo and its Kindred," by Strickland and Melville. There is also a head of the bird at Copenhagen.

ARTS AND MANUFACTURES.

MANUFACTURE OF TYPE.

The letters, &c., are first cut upon a steel punch. This requires great skill. The characters are oftentimes extremely minute, and every pains is taken to procure not only individual beauty but general uniformity. Not only letters, but figures, signs, and ornaments, in endless varieties, are thus cut. There are, also, spaces used to separate words. Quadrats, which are larger than spaces, separate sentences, and in general occupy the position among type that is represented by the unprinted parts; both spaces and quadrats being shorter than type. In a full font of type there are about three hundred different characters. The cost of the separate punches varies from two to fifty dollars. After the punch has been cut it is indented to a certain depth into a block of copper; this is called the matrix. Electrotyping has of late years been used for the purpose of obtaining matrices from the type itself, by which means type-founders are enabled to avail themselves of each other's labor. An apparatus, denominated the mould, is used for forming the body of the type, and to this mould, which answers for all the types of a font, the different matrices are adjusted as required. He who adjusts the matrices to the moulds is called a justifier, or more commonly a fitter. All the types of a font are of the same length and depth, though the letters upon them vary in their dimensions. The mould is so constructed as to admit of the width being altered to suit the letters to be cast; thus the letter I, which is very narrow, is upon the body of a type, the perpendicular face of which is precisely the same as that of the letter W, several times as

wide. It is necessary that the bodies of types should also have all their lines at exact right angles; without this they would not stand in line, and would consequently be useless. If the types varied in height, they would not give a perfect impression, in endeavoring to obtain which, some would be subjected to an injurious pressure. A few types have a portion of the face of the letter projecting over the body, as in the letter *f*; this projection is called the kern, and in combination with other letters the projecting part generally extends over the next letter, as in *fe*. In those combinations, wherein the kern would come in contact with another letter, compound types are cast, as in the case of ff, fi, fl, ffi, ffl. Some years since, these combinations were much more numerous, but many have been dispensed with by altering the form of the letter.

The next operation is that of casting. The old method, which is even to the present time generally used in England, may be thus described. The matrix having been adjusted to the mould, is taken by the caster in his left hand. At his right, upon a furnace is a pot of molten metal. This metal he dips out in suitable quantities with a small ladle, and pours into the mould, at the same time giving a quick upward jerk, for the purpose of forcing the metal well into the matrix, to give the type a good face. A spring which holds the matrix in its proper position is then removed; the matrix is pried out from off the type, the mould opened, and the type thrown out. By this method an average of about 4,000 types per day can be cast by one man. An important improvement was made in 1814, whereby, with one motion of the hand, the matrix was thrown out and the mould opened. This invention increased the rapidity with which types were cast at least fifty per cent. Type-casters acquired great expertness, and with the hand-moulds were enabled to cast with extraordinary rapidity, but only for a short time. In 1828, the casting machine was patented by a citizen of New York, and put in operation in Mr. White's foundry, since which time it has been greatly improved. By this contrivance, a pump inserted in the molten metal injects the requisite quantity into the mould, which is brought sharply into contact with the piston; the mould then comes off from the pump, opens and discharges the type into a box. In type foundries, generally, this machine is worked by hand; but in some, steam power is successfully employed. At least three times as many type can be cast by the machine as by the ordinary hand-mould, and a velocity of two hundred revolutions per minute (each revolution forming one type) has occasionally been obtained, though the actual results are by no means to be based upon

that fact. Various causes operate to prevent a long continuance of such speed.

The type, after being discharged from the mould, has a piece of metal, called the jet, attached to the bottom; this is broken off by a boy, called a breaker, and the singular swiftness of all his motions is truly astonishing. Smart lads or girls, who have had sufficient experience, perform all these operations with such rapidity, as to pain the eye that observes them. The jets having been removed, the types are taken to another room, where boys and girls are engaged in rubbing off the inequalities upon the sides. This is effected by bringing the type in contact with a smooth stone, prepared for the purpose, and moving it from side to side. The rubbers generally smooth several at the same time. Those letters which are kerned as before described, cannot be wholly rubbed upon a flat surface, and they are consequently filed smooth by an ingenious contrivance, which prevents the kern from being injured. After this operation, the types are set together, with the faces downwards, in a composing stick eight inches long, and thence are transferred to the setting stick, which is one yard in length. Those who do this are called setters. The dresser now takes the setting sticks, and placing the line of type upon a flat surface, tightens it with a screw; then, with a piece of steel having sharp angles, he rubs off the edges, turning the line of type for that purpose. They are then placed, face downwards, in a vice, and the dresser, with a plane, cuts a small groove in the end, over the place from which the jet has been removed. He now carefully examines the faces with a magnifying glass, rejecting all such as are in the least imperfect. The perfect types are now formed, and they are placed together, side by side, upon a small board with a frame on three edges, until there is a page. The page is uniform in size, being 6 by 4¼ inches. A cord is then drawn several times tightly around the page, and it is wrapped up in paper ready for the printer.

Type metal is readily fusible, and is composed of antimony, tin, and lead. These are used in various proportions, according to the size of the letter and the degree of elasticity required. Lately, a process by which the face of the type is coated with copper, thereby increasing its durability, has been adopted to a considerable extent. Until within a few years there were but few varieties of type in use—now they are to be counted by hundreds. They are cast from the most minute size up to large blocks having a surface face of sixteen square inches. Of Diamond type (the smallest size in use), 201 lines measures twelve inches. Of an average-sized Diamond letter 81,274 may be impressed

on a surface of one square foot; and there are Diamond spaces so small that 208,187 will go to a square foot, or 1,411 to the square inch: and of these about 6,200 are obtained from one pound of metal. The largest letter regularly supplied by type-founders is twelve-line pica; these are two inches on the perpendicular face, varying in width with the letter. The larger sizes that we see on show-bills, &c., are cut in wood.

CHROMO-LITHOGRAPHY.

Chromo-Lithography, or Color-Printing on stone, is the name of a new process, which promises to become one of the most popular developments of the fine arts.

Before copying a painting in chromo-lithography, the artist has mentally to dissect it, to determine how each tint is obtained, and with what color each form in the original is produced. To those who see it for the first time, the anatomy of a painting, in which the various colors are dissected off, as the successive layers of muscles are removed from the human subject, is rather a ghastly process; but the results are worth noticing, since the same talent which resolves a picture into its constituent elements is also capable of putting them together again. By devoting one stone to each tint or gradation of tint, and by printing one color over another, all the variety of the original is obtained. Thus, if we suppose a blue tint to have been printed from one stone, a second of yellow coming over a portion of the paper left white gives a tint of pure yellow, and over the blue, forms a green; thus three colors are produced by the printings; in addition to the variety of depth caused by more or less of the preparation being put on the stones. A red printed over these colors again increases the variety; each additional stone furthering it a stage; until the last gives the finishing touches.

The difficulties of the art are numerous, the principal being the proper distribution of the grays and cool tones, and the numerous minor tints by which the painter gives depth and transparency to his work. This difficulty can only be overcome by increasing the number of stones employed in the process: a proceeding involving much additional trouble and expense; whilst the number of impressions which can be taken from one set of stones is necessarily much more limited than that which can be obtained from a steel plate.

The illuminated and colored title-pages of music, which have of late years diversified the windows of music-sellers, are printed by a somewhat similar process; there is, however, this important differ-

ence, that the outline, or drawing in black, is done away with in chromo-lithography, and the tints of color, instead of being mere flat tones, are so worked as to produce all the delicate variations of the artist's touch,—so that the process requires an artist, almost or quite as skilled as the painter whose work he imitates.

ANASTATIC PRINTING

Is the *ἀνάστασις* (the first raising up) of copies from a printed sheet of paper, whether letter-press or engraving; this is first moistened with dilute nitric acid, and then pressed with considerable force by a roller on a clean surface of zinc. The acid with which the unprinted part of the paper is saturated *etches* the metal, and the printed portion *sets off*, so that the zinc surface presents a complete reverse copy of the work. The prepared plate is then washed with a solution of gum in weak phosphoric acid; the liquid is attracted by the etched surface, which it freely wets, while it is repelled by the oil of the ink in which the writing or drawing on the plate is traced. A leathern roller covered with ink is then passed over the plate, when a converse effect ensues. The repulsion from the oil, ink, and the watery surface prevents any soiling of the *unfigured parts* of the zinc plate, while the attraction between the oil and oil causes the ink to be distributed over the printed portions. The anastatic plate is now complete, and impressions are pulled from it by the common lithographic press.

CHARACTERISTICS OF A BANK-OF-ENGLAND NOTE.

Very little alteration has been made in the appearance of the Bank-of-England Note since it was first issued at the end of the seventeenth century; but the quality of the paper, and the engraved writing, have been brought to a high degree of excellence.

The paper has been made since 1719 at the same mill at Laverstoke, in the valley of the Test, in Hampshire, where about 50,000 notes are made daily. The paper is distinguished: 1. By its peculiar *white color*. 2. Its *thinness and transparency*, preventing any of the printed part of the note being washed out by turpentine, or removed by the knife without making a hole. 3. Its *characteristic feel*, crisp and tough, by the touch of which can be distinguished true from false notes. 4. Its *wire-mark* or *water-mark*, produced in the paper in a state of pulp (the mark is stamped upon counterfeit paper after it is made). In the water-marking, heretofore the device or water-mark was produced by an infinite number of wires stitched and sewn to-

gether,—now it is engraved in a steel-faced die, which is afterwards hardened, and is then used as a punch to stamp the pattern out of plates of sheet brass.* In this mark, the letters and figures are shaded, which produces artistic effect, and increases the difficulty of forgery. 5. The three *deckle edges* of the Bank-notes made in pulp. 6. The *strength* of the Bank-note paper, it being made entirely from *new* linen and cotton pieces: when unsized, a Bank-note will support 36 lbs.; when sized, it will lift 56 lbs.

The notes are surface-printed from electrotypes. The Britannia was designed by Mr. Maclise, R. A., and cut in steel by Thompson; and from this moulds are made by striking it upon pure soft lead. The originals are never employed in printing, but are simply used as mould-makers, from which electro-casts are taken by the use of Smee's ordinary battery and precipitating trough. For wooden moulds gutta percha is generally employed, the surface being black-leaded. The printing-ink is prepared by collecting in large chambers the smoke from burning coal-tar naphtha, and combining this soot with a peculiar varnish. The paper is thicker in the left-hand corner, to enable it to take a better and sharper impression of the vignette; in a counterfeit note, the paper is of equal thickness all over. Again, the paper is considerably thicker in the dark shadows of the centre letters, and the figures at the ends. Inks in forgeries are usually bluish, or brown. The Bank-notes are printed 3,000 per hour, at a Napier's steam-press. Lastly, the signatures are printed at the same time by the electrotype process.

"The individuality is given by a number and date being added to the denomination. The number is of no use alone; the date is of no use alone; but the number, date, and denomination conjointly mark the specific individual; and any person having these particulars can learn at the Bank to *whom* the note was issued, and *when* it was issued; the date of its *return* to the Bank, and the *person* to whom the money was *paid* for it, &c. It is not generally known to the public, that there are letters preceding the numbers of every note; and which, with the number, tell the whole story of it."

The protectives against counterfeit and alteration are: 1. Peculiarities in the pulp or manufacture of the paper. 2. Chemical preparations, introduced at the time of manufacture or subsequently. 3. Water-marks, or devices for distinguishing any given paper from all

* In a pair of Five-Pound Notes prepared by the old process, there were 8 curved borders, 32 figures, 168 large waves, and 240 letters, separately secured by 1,056 wires, 67,584 twists, and the same repetition where the stout wires were introduced to support the under surface.

others. 4. The style and subject of the engravings; and 5. The inks used in printing.

The practice of splitting a Bank-note can never be used for fraudulent purposes, because the printed surface is that which receives the water-mark; consequently the other, or unprinted surface, could not retain more than the faintest trace of it.

The Bank issues nine millions of notes per annum, representing nearly three hundred million pounds of money.

WHAT IS A FIRE-PROOF CONSTRUCTION?

What is "Fire-proof Construction?" is a question which has given rise to a great deal of discussion. Suppose an averaged size dwelling-house contains 40,000 cubic feet, built with brick partitions, stone stairs, and wrought-iron joists. Such a house will be practically fire-proof, because there is no probability that the furniture and flooring in any one room would make fire enough to communicate to another. But suppose a warehouse equal to twenty such houses, with floors completely open, supported by cast-iron pillars, and each floor communicating with the others by open staircases and wells; suppose, further, that it is half-filled with combustible goods, and perhaps the walls and ceilings lined with timber. Now, if a fire takes place below, the moment it bursts through the upper windows or skylights, the whole place becomes an immense blast furnace: the iron is melted, and in a comparatively short time the building is in ruins. The real fire-proof construction for such buildings are groined brick arches, supported on brick pillars only. The next best plan is to build the warehouses in compartments of moderate size, divided by party walls and double wrought-iron doors. Again, cast-iron gives way from many different causes. The castings may have flaws in them; or they may be too weak, being sometimes within 10 per cent. or less of the breaking weight. The expansion of the girders may thrust out the side walls. For instance, in a warehouse 120 feet × 75 feet × 80 feet, there are three continuous rows of girders on each floor, with butt joints; the expansion in this case may be 12 inches. The tie rods to take the strain of the flat arches must expand and become useless, and the whole of the lateral strain be thrown on the girders and side walls, perhaps weak enough already. Again, throwing cold water on the heated iron may cause an immediate fracture. For these and similar reasons, the firemen should not be permitted to go into warehouses supported by iron, *when once fairly on fire.*

The effect of fire on cast-iron, as stated by Mr. Fairbairn, is,

that the loss of strength in cold-blast cast-iron, in a variation of temperature of from 26° to 190° is 10 per cent., and in hot blast, at a variation of from 21° to 160° Fahr., is 15 per cent. Now if the loss of strength advances in any thing like this ratio, the iron will be totally useless as a support long before the fusing point is attained.

FINENESS OF INDIA MUSLINS.

At the time of the Great Exhibition of 1851, the local committee of Dacca, in India, gave notice that they would award prizes for the best piece of muslin that could be woven in time for the Exhibition. The piece which received the first prize was ten yards long and one wide, weighed only 8 oz. 2 dwts., and could be passed through a very small ring.—Prof. Royle's *Lecture before Society of Arts.*

THE ART OF MOSAIC.

Mosaic is named from *opus musivum*, *musaicum*, *mosaicum*, perhaps because Mosaic pavements were principally employed in temples dedicated to the Muses. It is also called *opus tessellatum* and *vermiculatum*, because the cubes of which it is composed are disposed in curved lines.

A mosaic is a painting executed by means of small tubes, called *sectilia* and *tesseræ*, of marble, glass, or stones of various colors, set in a bed of cement or mastic, in figures of arabesques, scrolls, rosettes, or figures, and even entire historical and mythological compositions. The work is then polished, not too highly, else the reflected lights would glitter on every part of the surface. The age of a mosaic may be determined by the nature of the materials employed; the more numerous these are, the more modern the mosaic. The beauty and perfection of the drawing, and the merit of the composition, are also excellent indications. Glass was scarcely employed till under the Roman empire in the decoration of apartments, roofs, and walls; it is of great importance in the ornamentation of churches, built by the new Greek architects of the Byzantine school. Besides pictures in mosaic, there are mosaics in relief, borrowed from the Greeks; and the colored cubes being set up, as types are by printers, in figures detached from gold grounds.

CAMEOS.

The ancients formed cameos by engraving figures in low relief on different kinds of silicious stones, generally those which had layers of

different colors; so that the figures appeared on differently colored grounds. Such cameos are now made in Southern Europe and in France, but the hardness of the material renders them very expensive. Porcelain and glass have been substituted; but the most successful are shells, which afford the requisite difference of color, and are soft enough to be worked with ease. Mr. Gray, in a communication read to the Society of Arts upon the manufacture of cameos, states that the shells used are those of the flesh-eating univalve, which are formed of three layers of calcareous matter, each layer being a perpendicular lamina placed side by side. The cutter selects those shells which have the three layers composed of different colors, as they afford him the means of relieving his work to the best advantage, but experience has shown that the Bull's Mouth, the Block Helmet, the Horned Helmet, and the Queen Conch are the best adapted for his purpose. The two first named are the most esteemed. The manufacture of cameos was, till within twenty years, confined to Italy and almost to Rome, but now large numbers are made in Paris. Thirty years ago the number of shells used annually was about 300, all of which were sent from England and the value of each shell in Rome was about $7.50. In 1848, the number of shells used in France alone was over 100,000, (80,000 being Bull's Mouth and 12,000 Queen Conch), of an aggregate value of nearly $50,000. The average value of the large cameos made in Paris is about $1.20 each, giving a total value of $160,000, while the value of the small ones is about $40,000.

CONDITIONS OF INVENTION.

In order that an important invention may be successful, two conditions must be favorable. First. It must be possible—that is, the scientific principle on which it is to be founded must be known. Second. The invention must be wanted; or, in other words, it must be called for by the character and intelligence of the times, or rendered especially desirable in a particular place by some peculiarity of climate, topography, &c.

With reference to the first position, it may be said that, in accordance with the well-known laws of permutation, an almost infinite number of new combinations or inventions may be formed from the present stock of scientific knowledge. This is true; but the inventions thus produced must be restricted as to kind; and though they be unlimited in number, they are not so as to character. No combination of known principles, before the discovery of galvanism, was suffi-

cient for the invention, by the most ingenious synthetical mind, of the electro-magnetic telegraph; but, after the discoveries made by Galvani and Oersted, this invention became possible.

In the history of the progress and development of a branch of science, a condition is reached when its principles become applicable to some practical purpose; and it is instructive to observe how, at this period, it suddenly assumes in the public mind a high degree of importance. The man who makes the application, though he may not have spent a tithe of the labor and thought on the subject which was bestowed on it by those who brought it into its practical state, is crowned as the discoverer of the whole. After this, however, competitors arise who claim a share of the reward, if not the honor of the invention. These labor to show that the first inventor derived his ideas from the discoverers. The public mind then takes another turn, and is disposed to do injustice on the other side; and it is only after a series of oscillations in public opinion that the true state of the case becomes generally known and acquiesced in.

With reference to the second proposition, we may state that so important an element is the state of public intelligence in regard to the success of an invention, that many of the most important processes of art have been more the result of the actual spirit and want of the age than the product of the ingenuity and knowledge of an individual; and in such cases the invention is frequently brought forth simultaneously by a number of different individuals. The art of printing may be placed in this category. At a certain period in the history of the world, this invention was loudly called for by the pressing necessities and peculiarities of the times. It was then produced; but had the attempt been made at an earlier date to introduce it, the result would probably have been a failure. We have a similar example in the application of steam to navigation. The world had, for years before this invention, been in possession of the steam engine, and a boat had even been propelled by steam on the Clyde, in Great Britain, but the invention was not appreciated. Neither the time nor the place were favorable to its introduction; and it was reserved for our country, with its immense plexus of navigable rivers, and its broad expanse of internal lakes, to call for this addition to the art of locomotion, and for the genius of Fulton to give a successful response. Even in this case the importance of the invention was so manifest, and its means of attainment so simple, that several competitors contended for the prize; and had any accident happened to retard for a few weeks the completion of Fulton's first boat, he would have been

anticipated in the result of his enterprise by the fortunate experiment of the elder Stevens. In making this statement, I would not wish to detract from the real merit of individuals; they have sufficient claims for remuneration and reputation in being among the first to appreciate properly the value of the improvement, and to avail themselves, at the earliest point of time, of the necessary means of accomplishing it. I may remark, in passing, that, from the foregoing views and statements, it is plain that the steamboat is emphatically an American invention. It was in this country that premiums were first offered for its production, and on the Hudson, in 1807, it was first reduced to practice. It was not adopted in England until 1812, and not until 1816 in France.

From a want of a knowledge of the state of science, and a due consideration of the proper time and place, many ingenious minds have wasted their energies in fruitless labor, waged with fortune an unequal war, and sunk into the grave the victims of disappointed hopes. Such men are frequently said to "live before their time;" but it remains to be proved whether, in the aggregate of cases, they have done more *good* or *evil*, and whether they most deserve our *admiration* or our *pity*. A premature, and, consequently, an unsuccessful attempt, often so prejudices the public mind against an invention, that, when the proper time actually arrives for its introduction, public sentiment is found arrayed against it, and difficulties have to be overcome which would not have existed had the first essay never been made.

The man of true genius never lives before his time; he never undertakes impossibilities, and always embarks in his enterprise at the suitable place and period. Though he may catch a glimpse of the coming light as it gilds the mountain top, long before it has reached the eyes of his contemporaries, and though he may hazard a prediction as to the future, he acts with the present.

There are some partial exceptions to this rule, and among them I would mention, with high respect, that of Oliver Evans, than whom no man in this country has ever done more to improve the art of locomotion. He indeed predicted that steam wagons would be used on common roads, and made attempts to reduce his idea to practice. The time, however, for the introduction of this invention has not even yet arrived, and at present we see no prospect of its coming. But he was more successful in the invention of the American high-pressure engine, which was so essential to the development of the vast resources of the interior regions of our continent. This engine was, at the time

of its introduction, admirably adapted, in its cheapness, simplicity of arrangement, smallness of dimensions, and great power, to the abundance of fuel, the extent of transportation, and the primitive state of the arts in our country. The low-pressure engine used by Fulton was procured from England; and had steam navigation been confined to the employment of this complex and ponderous machine, the Mississippi and its tributaries would have remained for years unnavigated, except by the canoe of the native or the flat-boat of the pioneer.

The invention and introduction of this engine required the application of genius, energy, and courage. The use of high steam had been proposed in England, but had been discarded on account of the supposed danger attending on its use, and it was reserved for this country to demonstrate its practical importance. Without precursory labors equivalent to those of Evans, the present railway locomotive would not have been in existence.—Prof. Henry.

INDEX.

THE END.